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Results of the surgical treatment of gastrointestinal stromal tumours: a case series

Michał Brzeziński[A] ✉, Jan Pawlus[B], Jakub Jędrych[C], Tadeusz Sulikowski[D], Jarosław Lichota[E]

Independent Public Teaching Hospital No. 1 of Pomeranian Medical University in Szczecin, Department of General, Minimally Invasive and Gastroenterological Surgery, Unii Lubelskiej 1, 71-252 Szczecin, Poland

[A] ORCID: 0000-0002-7024-2481; [B] ORCID: 0000-0003-0671-2482; [C] ORCID: 0000-0003-4237-2032; [D] ORCID: 0000-0003-0847-1344; [E] ORCID: 0000-0002-9385-2354

✉ mbrzezinski1@o2.pl

ABSTRACT

Gastrointestinal stromal tumours (GISTs) are rare malignant neoplasms that develop mainly in the gastrointestinal tract. They typically cause non-specific dyspeptic symptoms in the abdominal cavity or gastrointestinal bleeding. Treatment may vary depending on the location, mitotic activity and clinical manifestations of the tumour. This study analyses the cases of patients with GISTs treated at the Department of General, Minimally Invasive and Gastroenterological Surgery of the Independent Public Teaching Hospital in Szczecin, Poland, from 2017 to 2022.

Keywords: gastrointestinal stromal tumours – GIST; case series; gastrointestinal stromal tumour; gastrointestinal bleeding.

INTRODUCTION

Gastrointestinal stromal tumours (GISTs) are malignant neoplasms originating from mesenchymal tissue, specifically from interstitial cells of Cajal. Gastrointestinal stromal tumours account for 80% of gastrointestinal sarcomas [1]. They develop as a result of mutations in the *KIT* or *PDGFR* alpha genes. These tumours are rare, with approx. 5 new cases per 1 million people a year. Gastrointestinal stromal tumours usually occur in middle age, with no differences with regard to sex [2, 3, 4]. They are located in the gastrointestinal tract, most frequently in the stomach with the small intestine being the second most common location and the colon being the third. However, in 10% of cases, tumours can be found in the oesophagus, mesentery, greater omentum and anus [5, 6]. Clinical manifestations of GISTs include non-specific symptoms such as abdominal discomfort, dyspepsia similar to peptic ulcer disease and gastrointestinal bleeding. There are no typical symptoms for GIST and the intensity and nature of symptoms are usually associated with the size and location of the tumour [5].

Gastrointestinal stromal tumours metastasise primarily to the liver and peritoneum. Less common locations for metastases include lymph nodes, lungs and bones [1].

There are 2 groups of patients depending on the symptoms: those in whom acute disease led to the detection of the tumour and those in whom the tumour was incidentally discovered [7]. Tumours in the small intestine are the most common cause of acute disease in the abdominal cavity and are usually manifested by obstruction. A GIST in the stomach is a less common cause of acute abdominal disease; however, when it does occur, its primary clinical manifestation is upper gastrointestinal tract bleeding or chronic microcytic anaemia [2, 7, 8]. Surgical resection of the tumour is the treatment of choice. A potentially radical procedure can be performed in 75% of patients diagnosed with a GIST [5]. Tumours smaller than 2 cm in their largest dimension are classified as small and are usually found incidentally during endoscopy [9]. If they are symptomatic, removal is recommended. Small asymptomatic abnormalities with no assessed risk factors on endoscopic ultrasound (EUS) may be observed and require follow-up every 6–12 months [10, 11]. Another possibility is endoscopic resection; however, it is only feasible for small submucosal tumours [2, 12]. Tumours between 2–5 cm can be removed by laparoscopy or open surgery, while tumours larger than 5 cm should be excised using the traditional method [13].

Adjuvant treatment with tyrosine kinase inhibitors depends on the extent of resection, the presence of metastases and the risk of recurrence. The risk of recurrence is usually assessed using 2 clinical classifications: Miettinen–Lasota and the National Institute of Health (NIH) [14]. Adjuvant treatment with tyrosine kinase inhibitors is used for non-radically removed tumours, those with distant metastases or those with a high risk of recurrence. The introduction of tyrosine kinase inhibitors significantly improved treatment outcomes. Currently, patients with limited GIST achieve a 91% 5-year survival rate; the rate for individuals with locally advanced disease is 74%, and it is 48% for patients with distant metastases [15]. The median overall survival for advanced or metastasised GIST is approx. 51–57 months [16].

CASE STUDIES

Medical records were analysed of 7 patients diagnosed with GISTs who were treated at the Department of General, Minimally Invasive and Gastroenterological Surgery of the

Independent Public Teaching Hospital No. 1 (SPSK-1) of the Pomeranian Medical University in Szczecin, Poland, from 2017 to 2022. The mean age of patients treated for GIST was 60.5 years. Among the 7 patients, there were 2 women and 5 men. Four patients required emergency or expedited elective surgery, while 3 patients underwent elective procedures. Among the urgent procedures, 3 were performed due to gastrointestinal bleeding and 1 due to gastrointestinal perforation. The present study discusses the cases of the 7 patients who received emergency or expedited elective surgery at our department. The characteristics of the patients of the study group are presented in Table 1.

TABLE 1. Characteristics of the study group

Variable	Patients (n = 7)		
Gender	male (n = 5)	female (n = 2)	
Surgery type	emergency (n = 4)	elective (n = 3)	
Localization	stomach (n = 6)	duodenum (n = 1)	
Symptoms	pain (n = 2)	GI bleeding (n = 4)	perforation (n = 1)
Diagnosis	gastroscopy (n = 6)	laparotomy (n = 1)	
	<5	6–10	>10
Tumor size (cm)	4	2	1
Mitotic rate (per 50 HPF)	5		2

HPF – high power fields; GI – gastrointestinal

The first case involved a 68-year-old woman admitted to the department for an elective wedge gastrectomy due to GIST. The patient had chronic hypertension and had a dual-chamber pacemaker implanted because of sick sinus syndrome. Initially, she was hospitalised at the Department of Internal Diseases of the hospital in Barlinek, Poland, due to abdominal pain and diarrhoea. Gastroscopy revealed a submucosal tumour with central ulceration near the cardiac orifice. Samples were collected for histopathological examination, which showed chronic active gastritis. Conservative treatment was administered, and the patient was discharged home with instructions to report to the Department of Gastrology of the SPSK-1.

During hospitalisation at the Department of Gastrology, an EUS was performed, showing a suspected GIST located beneath the cardiac orifice. A surgical consultation was conducted and elective surgery was agreed upon. On March 27, 2017, a wedge gastrectomy was performed without complications. The patient was discharged home on the nineth day in good condition. Histopathological examination revealed a gastric stromal tumour measuring 4.5 cm in its largest dimension. Four mitoses were observed per 50 high power fields (HPF). The tumour's risk of progression was 1.9% according to the Miettinen–Lasota classification and low risk according to NIH criteria. The tumour was resected with a 1.5 mm margin of healthy tissue margin. Following the histopathology report, diagnostic imaging was performed, including a computed tomography (CT) scan that showed suspected liver metastases; for this reason, somatostatin receptor scintigraphy was also conducted. The patient's case was discussed during a cancer team meeting, and it was concluded that close endoscopic surveillance and follow-up at a surgical clinic were recommended.

The second case involved a 56-year-old man with no chronic diseases who was admitted to the department for an elective wedge gastrectomy due to GIST. He was referred from the Department of Internal Medicine of the Independent Public District Hospital in Nowogard, Poland, where he had been hospitalised for gastrointestinal bleeding. Gastroscopy and abdominal CT scan were performed at the Nowogard hospital, revealing a tumour on the posterior gastric wall at the border between the body and the fundus of the stomach. Bleeding stopped with conservative treatment and the patients received packed red blood cells to restore a satisfactory haemoglobin level. Histopathological examination revealed an image consistent with GIST.

The patient was subsequently admitted to the Department of General, Minimally Invasive and Gastroenterological Surgery for a wedge gastrectomy. The procedure was successful with no complications. The patient was discharged home on the seventh day in good general condition. Histopathological examination of the collected material revealed a GIST measuring 11 cm at its largest dimension. Extensive areas of necrosis and haemorrhage, along with moderate cellular atypia and over 60 mitoses per 50 HPF. R0 resection was performed. The tumour's staging was pT4 Nx Mx. The risk of recurrence was 86% according to the Miettinen–Lasota classification and high as per NIH criteria. The patient's case was discussed in a cancer team meeting, and close follow-up at our department's surgical outpatient clinic was recommended.

The third case involved a 67-year-old man with no comorbidities who was referred to our department from the Department of Gastrology of SPSK-1, where he had undergone diagnostic procedures to investigate a fluid abnormality in the stomach. The patient had been experiencing a sense of fullness in the upper abdomen, distension, loss of appetite and weight loss of approx. 10 kg. Due to these symptoms, an abdominal ultrasound scan was performed, which revealed that the fluid abnormality in the upper abdomen was, in fact, a dilated stomach. The patient did not present with any symptoms of gastrointestinal obstruction. Gastroscopy showed proximal dilation and distal stenosis of the stomach with no mucosal lesions, suggesting compression from the outside. A CT scan of the abdominal cavity was performed, revealing a giant tumour originating from the posterior gastric wall, extending as far as the pelvis, measuring 24 cm. The tumour compressed the stomach, indenting the entire upper abdomen, and narrowed the lumen of the inferior vena cava. Based on the CT image, a stomach GIST was suspected.

The patient was admitted to the Department of General, Minimally Invasive and Gastroenterological Surgery for an elective procedure. On November 15, 2017, laparotomy was performed. The tumour was exposed and freed from multiple

adhesions. On its posterior surface, the tumour strongly adhered to the tail of the pancreas. After releasing the adhesions, a wedge gastrectomy at the tumour's point of origin was initiated. There were no complications during the procedure. However, after the operation, the patient developed a pancreatic fistula. On day 3, an alarming content was observed in the drain. A sample was collected to measure the activity of amylase in the abdominal fluid and the result was 18,640 U/L, confirming the presence of a pancreatic fistula was confirmed. Conservative treatment was applied, involving total parenteral nutrition, intravenous somatostatin administration and endoscopic retrograde cholangiopancreatography (ERCP) to check for postoperative damage to pancreatic ducts. The first attempt at ERCP was unsuccessful, while the next attempt did not reveal any obvious site of contrast leakage, although contrast was found in the peripancreatic space. Conservative treatment led to gradual improvement, and the patient was discharged home with a wound drain on day 19 after the surgery. Histopathological examination of the material collected during the operation revealed a spindle cell type GIST with extensive areas of necrosis. The tumour's mitotic index was 85 per 50 HPF. The risk of recurrence was 86% according to the Miettinen–Lasota classification and classified as high risk as per NIH criteria. The tumour was staged as pT4 Nx Mx. The patient's case was discussed in a cancer team meeting. The wound drain was removed during a follow-up visit at the department's surgical outpatient clinic on day 33 after the operation.

The fourth case involved an 81-year-old woman with ischaemic heart disease, atherosclerosis, arterial hypertension and sliding hiatus hernia. In 2014, she was diagnosed with a GIST located on the anterior gastric wall, which was regularly followed up. Due to minimal tumour progression, advanced age and comorbidities, the patient did not consent to surgery. She was admitted to the Department of General, Minimally Invasive and Gastroenterological Surgery on an emergency basis due to gastrointestinal bleeding. Initially, conservative treatment was applied. Haemostatic drugs and packed red blood cells were administered, and gastroscopy and abdominal CT scans were performed. Surgery was scheduled for January 31, 2018, due to signs of active bleeding found on gastroscopy. The procedure revealed a 7 cm tumour of the anterior gastric wall in the body of the stomach and a wedge gastrectomy was performed. There were no complications during the procedure. On the fourth day after the operation, signs of gastrointestinal bleeding were observed, which stopped after conservative treatment. Three days later, the patient was discharged home in good general condition. Histopathological examination of the tumour revealed a spindle cell type GIST. The abnormality was resected along with a healthy tissue margin. The tumour's mitotic index was 1 per 50 HPF. The risk of recurrence according to the European Society for Medical Oncology (ESMO) classification was 3.6% and it was categorized as intermediate as per NIH criteria. The tumour's stage was pT3 Nx Mx. The patient's case was discussed in a cancer team meeting and close follow-up at our department's surgical outpatient clinic was recommended.

The fifth case involved a 54-year-old man who was admitted to the Department of Gastrology on an emergency basis due to signs of gastrointestinal bleeding. Following admission, gastroscopy, abdominal ultrasound scan and chest radiography were performed. Gastroscopy revealed an over 5 cm tumour in the body of the stomach, which was the source of bleeding. The tumour was treated by injecting adrenalin and coagulating with an argon beamer, and haemostasis was achieved. No significant abnormalities were found on other tests and examinations. Following surgical consultation, elective surgery was agreed upon. On March 12, 2018, a laparotomy was performed, during which a 5 cm pedunculated tumour originating from the posterior gastric wall was found. Gastrotomy was performed on the greater curvature and a linear stapler was used to remove the tumour. The stomach opening was closed with a linear stapler and the staple line was sutured using a continuous pattern. There were no complications during the procedure and hospitalisation. On the seventh day, the patient was discharged home in good general condition. Histopathological examination demonstrated a spindle cell type GIST with a mitotic index of 5 per 50 HPF and extensive areas of necrosis. The tumour was removed along with its capsule, leaving a healthy tissue margin. The risk of progression was assessed as low based on the Miettinen–Lasota classification. It was decided that the patient would be closely monitored by the department's surgical outpatient clinic, and that a follow-up gastroscopy was planned in 4–6 weeks.

The sixth case involved a 71-year-old man who was transferred by emergency medical services to the Admissions Department of the Department of General, Minimally Invasive and Gastroenterological Surgery due to abdominal pain. The patient's complaints were localized in the mid-upper abdomen and had been ongoing for 3 days, gradually worsening. The patient had a history of laparotomy and abdominal aortic aneurysm surgery with vascular prosthesis implantation in 2015, and bilateral carotid endarterectomy in 2016. In addition, the patient suffered from chronic pancreatitis and arterial hypertension.

Upon admission to our department, the patient was hypotensive and tachycardic but in relatively good general condition. Clinical examination revealed tenderness and peritoneal symptoms across the entire abdominal cavity. Urgent laboratory tests were conducted, including blood typing and crossmatching for 2 units of packed red blood cells, along with diagnostic imaging studies. Laboratory tests indicated elevated inflammatory markers and diagnostic imaging showed signs of gastrointestinal perforation. A decision was made to perform urgent exploratory laparotomy, with the patient's consent. Antibiotic prophylaxis was administered and the patient was prepared for the procedure according to protocol.

The abdominal cavity was opened using a midline incision, revealing intestinal content and signs of diffuse peritonitis. A 5 cm tumour with an evident perforation channel was found on the anterior wall near the pylorus. A Billroth I surgery was performed. The peritoneal cavity was lavaged and 2 Pezzer drains were placed for drainage. The excised tissue was sent for histopathological examination. The operation proceeded without complications.

Following the procedure, total parenteral nutrition was administered for 4 days. In addition, a wide-spectrum antibiotic therapy, anti-thrombosis prophylaxis and proton pump inhibitor treatment were applied. On the fourth day, a liquid oral diet was initiated, and on the next day, an easily digestible diet was provided, which was well tolerated by the patient. The patient was discharged on the sixth day after the operation in good condition and instructed to collect the histopathology report, and advised to attend follow-up at the department's surgical outpatient clinic for wound inspection and suture removal.

The collected surgical specimen was identified as a spindle cell tumour without signs of atypia and with a low mitotic index (fewer than 3 mitoses per 50 HPF). A macroscopic finding of a perforation channel running through the centre of the tumour was noted. The histopathological examination confirmed that an R0 resection had been successfully performed. The patient has been under follow-up care at the department's surgical outpatient clinic.

The final case involved a 56-year-old man who was urgently admitted to the Department of Gastrology of SPSK-1 due to gastrointestinal bleeding. During hospitalisation, the patient was diagnosed with a thyroid crisis and atrial fibrillation. Gastroscopy did not reveal signs of bleeding, but colonoscopy revealed the presence of blood in the entire colon and in the final section of the ileum. Haemostatic drug therapy was initiated, and packed red blood cells and fresh frozen plasma were administered. The patient received a consultation with an endocrinologist. Despite conservative treatment, the bleeding persisted; leading to the decision to perform arteriography with an embolisation attempt. However, the procedure did not reveal the source of the bleeding, and the patient subsequently developed signs of acute myocardial ischaemia. A type 2 myocardial infarction associated with anaemia and active bleeding was diagnosed.

On December 25, 2021, after surgical consultation, an urgent laparotomy was performed, during which the entire course of the colon and small intestine was checked. A 5 cm tumour was found approx. 10 cm from the ligament of Treitz. The tumour was excised locally and a side-to-side anastomosis was performed on the small intestine using a double-layer suture pattern. Postoperatively, no gastrointestinal bleeding was observed. The patient was discharged on the 10th day in good general condition.

The material excised during surgery was identified as a spindle cell tumour measuring 5 cm without signs of atypia and with a low mitotic index (fewer than 3 mitoses per 50 HPF). The risk of recurrence was classified as low according to the NIH classification. The entire tumour was resected, and the tumour tissue extended to the incision line. The patient's case was discussed in a cancer team meeting and the decision was made to provide a more radical procedure.

On April 8, 2022, a repeat laparotomy was performed, during which a section of the small intestine was removed. The operation proceeded without complications. In the postoperative period, the patient developed gastrointestinal obstruction, leading to a repeat laparotomy on April 13, 2022, during which adhesions were released. There were no complications in the subsequent days of hospitalisation and the patient was discharged home in good general condition on the 10th day after laparotomy. No cancer cells were found in the intraoperative material.

Currently, the patient is awaiting a cancer team conference. Following the presentation and discussion of their cases during cancer team meetings, all the patients who underwent surgery at our department were placed under the surveillance of our department's surgical outpatient clinic based on a follow-up schedule. Typically, patients who underwent surgery for a GIST were seen by a doctor every 3–6 months for up to 5 years. No recurrences were observed.

DISCUSSION

Gastrointestinal stromal tumours often do not present with any clinical symptoms; however, when symptoms do arise, GISTs located in the stomach commonly manifest as gastrointestinal bleeding or dyspepsia resembling gastric ulcer disease [17]. Bleeding from the tumour often coincides with ulceration of the tumour's mucosa, which can lead to a misdiagnosis of peptic ulcer disease [7]. It is important to note that tumours account for 10% of stomach perforation cases. If the patient's condition allows, a distal resection of the stomach along with the excision of the ulcerated area should be considered. Resection with the goal of achieving radical removal is the most effective method for treating GISTs; therefore, when there is a clinical suspicion of a GIST, it is crucial to excise the abnormal tissue with a sufficient healthy tissue margin. This is particularly significant as subsequent GIST recurrence surgeries typically do not result in successful recovery, especially over longer follow-up periods [14]. Literature reports suggest that the most common probabilities of remaining disease-free at 3 years and 5 years are 97.6% and 95%, respectively. In the cases analyzed, no recurrences were observed, although this may be attributed to the small study group.

CONCLUSIONS

The significant advancements in minimally invasive techniques have widened their application in cancer treatment. According to the literature, the choice of surgical approach does not significantly impact the long-term outcomes of GIST treatment, as long as the operating surgeon possesses the appropriate experience and ensures a sufficient healthy tissue margin during resection. Reports indicate that this approach is safe, associated with low morbidity, and achieves a high rate of R0 resection. Laparoscopy is the primary choice for elective GIST resections involving tumours smaller than 2 cm. Moreover, patients referred from less specialised facilities can receive comprehensive care from a multidisciplinary team, along with adjuvant treatment involving tyrosine kinase inhibitors, which significantly contributes to treatment outcomes.

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