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Original Article

The investigation of incidence and radiological findings of gastrointestinal stromal tumor as a rare cause of abdominal mass

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Abstract

Aim: The aim of the present study was to evaluate the investigation of incidence and radiological findings of gastrointestinal stromal tumors (GIST) as a rare cause of abdominal mass, with current literature review.

Material and Methods: Between February 2011 and May 2016, a total of 4,443 patients who underwent abdominal multislice computed tomography and magnetic resonance imaging due to the clinical indications for abdominal pain, abdominal swelling-mass were analyzed in our hospital. The retrospective cross-sectional study included forty-five patients, who were subsequently diagnosed with GIST histopathologically.

Results: GIST was identified in 45 (1%) patients. Of the total 45 patients, 21 (47%) were men and 24 (53%) were female. The mean age was 55 years, ranging from 35 to 73 years. As a result of radiological examinations, the tumor location was stomach in 22 cases (49%), small intestine in 12 cases (27%) and colon in 9 cases (20%). The retroperitoneal localization was also found in 2 cases (4%). The average size of the lesions ranged between 2 and 15 cm. Malignant degeneration and omental metastasis were seen in 11 (24%) and 7 cases (16%) respectively.

Conclusion: GIST is a rare cause of abdominal mass with an incidence of 1% in our region. They are most commonly localized in the stomach, rarely in the omentum/mesentery and retroperitoneum. The Malignant transformation is not frequent. Diagnosis and evaluations of mass can be made successfully by radiological imaging modalities.

Keywords: Gastrointestinal Stromal Tumors; Abdomen; Multislice Computed Tomography; Magnetic Resonance Imaging.

INTRODUCTION

Gastrointestinal stromal tumors (GIST) are submucosal-located mesenchymal tumors that can be seen in all areas along the gastrointestinal tract. It is frequently located in the stomach (50-60%) and then in the small intestines (25%), Colorectal (10%), omentum / mesentery (7%), esophagus (5%) and rarely retroperitoneal (3%) involvement have also been reported (1,2).

They usually occur between 4-7 decades. Clinical findings may vary depending on the size of the tumor and its location, but patients usually present with abdominal pain, gastrointestinal bleeding, and mass in the abdomen. GISTs measuring 2 cm are usually asymptomatic and carry a low risk of malignancy. Malignant degeneration and metastasis can be seen in larger sized lesions. The differential diagnosis of benign GISTs from malignant sarcomatous masses is of great importance. Radiologically; size, location, features,

neighborhoods, and metastasis evaluation can be done by multislice computerized tomography (MSCT) and magnetic resonance imaging (MRI). There are varying incidence outcomes in different areas in the literature and there is no common consensus. In this study; we aimed to investigate the incidence of GIST in our region and to evaluate its radiological findings in the cases which the diagnosis has been confirmed histopathologically in the context of current literature.

MATERIALS and METHODS

This study was conducted following the approval from the Non-Interventional Clinical Research Ethics Committee from the Institutional Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Between February 2011 and May 2016, a total of 4,443 patients who underwent abdominal MSCT and MRI due to the clinical indications for abdominal pain, abdominal swelling-mass were analyzed in our hospital. The retrospective cross-sectional study included 45 patients, who were diagnosed with GIST after radiological examinations, surgical excision, and histopathologic diagnosis.

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All patients were examined by MSCT using a Toshiba Aquilion 64 Toshiba Medical Systems, Tokyo, Japan. The scanning area was identified between the diaphragm and the iliac crest. Images were of kVp 120, mAs 150-200 value, and 0.5 mm collimated cross-section thickness, 0.5 mm reconstruction interval, diameter FOV (30 cm), and with a pitch value between 1-1.5. Investigations were initiated one hour before the examination every 15 min, following totally 1000–1500 mL oral consumption of water. All examinations were performed with the patients in the supine position and automatic injection of 1mL/kg iopromide or iohexol at a rate of 3 mL/sec through the right antecubital vein, through single breath-holding at 65 sec.

The 1.5T MRI device (Philips Ingenia, USA) was used for MRI scanning. All patients were placed in the supine position with the head placed first into the device. The patients were prepared for analysis using a 32-channel body coil, accompanied by pulmonary monitarization. The patients were also informed about the instructions to be followed. Communication with the patient during the process was made with the assistance of hearing aid systems compatible with MRI. None of the patients were sedated during the imaging procedure. The following parameters were used for the MR images: matrix: 288x251, the number of excitations (NEX): 1.0, the field of view (FOV): 40x35 cm, cross-sectional thickness: 4 mm, space between cross-sections: 0.5 mm, repetition time (TR): 441 msec, and echo time (TE): 80 msec.

The MSCT and MRI images were transferred to the study center (VITAL, Vitrea 2, HP XW6400 Workstation, USA). Images were evaluated as multiplane and three-dimensional images. The images of each case were examined in terms of mass size, content, location, neighborhoods, environmental fat plans, contrast media enhancement and possible pathologies of other gastrointestinal structures. The presence of metastasis was investigated and findings were recorded.

RESULTS

GIST was defined in 45 patients (1%). Of the 45 cases, 21 (47%) were male and 24 (53%) were female. Their ages ranged between 35 and 73 with a mean age of 55 years. Routine biochemistry and tumor parameters were generally normal except for 11 cases. As a result of radiological examinations, GIST was detected in 22 cases (49%) in the stomach, 12 cases (27%) in the small intestine, 9 cases (20%) in the colon and 2 cases (4%) in the retroperitoneum. Malignant degeneration was present in 11 cases (24%) and metastases to liver and omentum were observed in 7 cases (16%). The average diameters of the lesions ranged from 2 cm to 15 cm. Present findings are summarized in table 1.

In contrast enhanced abdominal MSCT and MRI examinations, the present cases were observed as solid masses with varying sizes, showing heterogeneous, partially peripheral enhancement in various localizations, with smooth-lobular contours (Figure 1a,b-2 a,b). The small intestines around the mass were not obstructed in the retroperitoneal mass (Figure. 3 a,b).Central cystic-necrosis areas were observed with measuring over 10 cm malignant lesions (Figure 4 a,b). 38 patients underwent total mass resection. Patients were discharged without post-operative complications. The 7 patient having malignant form of the disease was included in the chemotherapy program.

Table 1. Radiological findings obtained from our study

Localization	No	Size	Benign	Malign	Metastasis
Stomach	22	2-15 cm	17	5	3
Small intestine	12	2-5 cm	9	3	2
Colon	9	4-8 cm	6	3	2
Retroperitoneum	2	10-12 cm	2	_	_

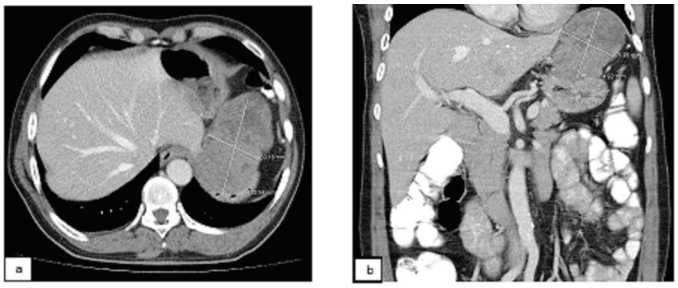

Figure 1. Oral and IV contrast-enhanced upper abdomen MSCT examination; in the axial (a) and coronal (b) images, a mass lesion with a heterogeneous contrasting, cystic-necrotic character, with exophytic extension, which complies with the diaphragm, is observed in the gastric fundus segment.

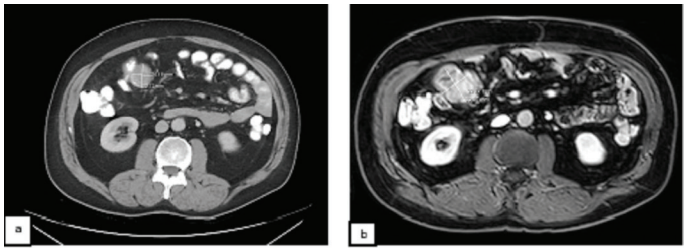

Figure 2. Oral and IV contrast-enhanced upper abdominal MSCT examination; the axial image, with an exophytic extending GIST (a). Contrast-enhanced upper abdomen axial MRI examination showed heterogeneous contrast enhancement mass originating from ileum (b).

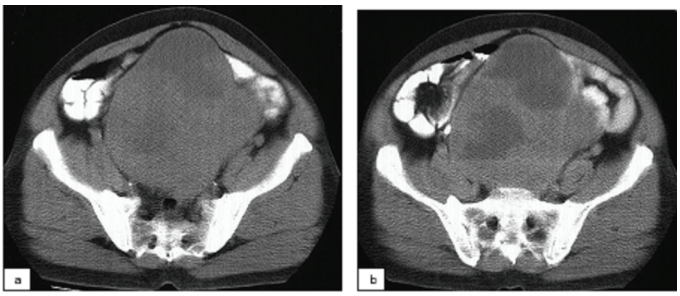

Figure 3. Une,nhanced (a) Oral-IV enhanced (b) axial lower abdominal MSCT examination; a solid mass lesion is seen in the pelvic region, with retroperitoneal placement, smooth-lobular contouring, cystic-necrotic areas with heterogeneous contrast involvement, but not obstruction, which spreads around the small intestine.

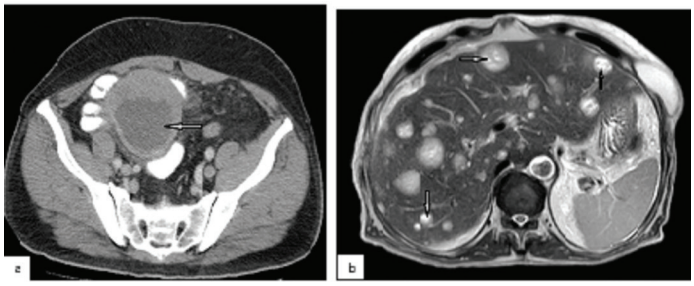

Figure 4. Oral-IV enhanced axial lower abdominal MSCT examination; malignant GIST, central cystic-necrosis areas were observed (arrow) (a). Axial T2 weighted upper abdomen MRI revealed multiple liver metastases with central necrosis areas (arrows) (b).

DISCUSSION

GIST is a mesenchymal tumor with specific histological features, located in the gastrointestinal tract and abdomen as a primary. The very different results of different centers related to the incidence in the literature are reported and the actual frequency is unknown (3-7). It is most commonly located in the stomach originating from the the antrum and corpus (70-90). Fundus of the stomach is rarely located (8). Other sites are small intestine (25%), colorectal area (10%), omentum/mesentery (7%), esophagus (5%) and more rarely retroperitoneum (3%) (1,2). GISTs measuring 2 cm and smaller size are usually asymptomatic clinically. Patients may present with abdominal pain, gastrointestinal bleeding, anemia, abdominal mass, dyspeptic complaints, dysphagia, swallowing difficulty, and perforation (9). Although they may become large masses, intestinal obstruction findings are relatively less visible.

Theoretically, all GISTs are considered to have malignancy potential. For this reason, the use of very low risk, low risk, intermediate risk and high risk definitions in histopathologic evaluation rather than benign or malignant discrimination is more accurate (10). Metastases are not common, although malignant tumors can reach large sizes. The most common sites of metastases are liver and peritoneum, as well as lymph nodes, lung, and bone marrow (11,12). At the time of diagnosis; after historical and physical examination, radiological modalities such as ultrasonography (US), contrast enhanced abdominopelvic MSCT and MRI should be performed. Endoscopy, endoscopic US (EUS) can be done if required. Positron emission computed tomography (PET/CT) helps to detect malignant lesions and to show metastases if it is present.

The MSCT and MRI features of GISTs vary greatly, depending on the size and aggression of the tumor. Primary GISTs are typically large, hyper vascular, enhancing masses on contrast-enhanced MSCT and MRI scans and are often heterogeneous because of necrosis, hemorrhage, or cystic degeneration. Ulceration and fistulation to the gastrointestinal lumen are also features of GISTs. The masses usually displace adjacent organs and vessels. Direct invasion of the adjacent structures is seen with advanced disease (13). It can be difficult to identify the origin of the mass because of its large size and prominent extra luminal location. Bowel obstruction is rare.

Other retroperitoneal mesenchymal tumors, inflammatory fibroid polyps, solitary fibrous tumors, leiomyomas, schwannomas, and angiosarcoma may be considered in the differential diagnosis of GISTs. No radiological or endoscopically examination method is sufficient to correct diagnosis of GIST alone. A biopsy is needed for definitive diagnosis. However, the use of preoperative fine-needle aspiration biopsies from surgically removable masses is rarely recommended due to the risk of degradation of capsule integrity and tumor cell installation. Therefore, radiological findings and differential diagnosis are more important. Definite diagnosis is made by histopathological examination after surgery.

GISTs have some staining characteristics in immunohistochemically. C-kit (CD 117) 95%, CD 34%60-70 and smooth muscle actin 30-40% are positives. Besides these, many immuno-histochemical markers are being investigated in differential diagnosis and prognosis determination of GISTs (14). Treatment in GISTs differs according to the clinical and laboratory findings of the patient and the radiological-histopathological features of the tumor. Surgical resection should be considered as a priority option in all GISTs. Despite reaching large sizes, it is easy to achieve a negative surgical margin, since they are not infiltrating too much. Lymph node metastases are rare. Patients who cannot undergo total excision due to metastases and those whose general condition is not suitable for surgery, medical treatment is preferred (15).

Imatinib is widely used in medical treatment and it is appropriate to switch to sunitinib therapy in patients with progression of the tumor with treatment. The use of other receptor tyrosine kinase inhibitors such as nilotinib or sorafenib may also be considered (16). Follow-ups should be done at 3-6 month intervals, with contrast-enhanced abdominal MSCT. In some rare malignant cases, they can be followed with PET/CT (17).

CONCLUSION

In conclusion, GIST is a rare mesenchymal tumor of the gastrointestinal tract. In our study, the incidence was 1%. Radiological imaging's method provide detailed information about the tumor and contribute to preoperative diagnosis, additionally, enable to evaluate the efficacy of the treatment, tumor progression and recurrence after surgery. MSCT can be used in generally, and with it, US, MRI, PET/CT imaging can be preferred as a radiological modality for this purpose.

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