Gastrointestinal stromal tumors: radiologic findings and assessment of response to treatment with Imatinib using CT

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Learning objectives

To review radiological findings useful in the diagnosis and management of gastrointestinal stromal tumors (GIST) described in the literature, including those that are part of the criteria for treatment response Choi. Describe the radiological findings of GIST cases treated in our hospital during the last ten years.
Background

Gastrointestinal stromal tumors (GIST) are a heterogeneous group of tumors that represent the most common mesenchymal tumors of the gastrointestinal tract. Is believed to have its origin in the myenteric plexus or pluripotent stem cells capable of differentiating into cells of Cajal and smooth muscle cells.

Histologically defined by being composed of spindle cell populations or epithelial KIT (CD117) positive, recognizing four types based on the immunohistochemical findings (with differentiation into smooth muscle cell with nerve differentiation, undifferentiated and mixed), however histological differentiation between them is complex and sometimes impossible.

The malignant behavior of these tumors is variable, while some cases show a benign or low malignant potential, up to 30% of them are very aggressive, metastatizing rapidly in the liver, peritoneum, lung, bone and lymph nodes.

According to the literature, the typical neoplasms GIST are seniors (from the sixth decade), in order of frequency that affect the stomach (60-70%), small intestine (20-25%), colon and rectum (5%), esophagus (<5%) or mesentery and omentum (<5%). Do not have a predilection for one gender or another. Clinically may present with ill-defined abdominal discomfort, postprandial fullness or with mild diffuse abdominal pain. Not infrequently the diagnosis as an accidental finding since in many cases are asymptomatic. In other cases they can lead to a marked constitutional symptoms of fatigue and weight loss. Nor is it uncommon cause of gastrointestinal bleeding are either chronic, resulting in anemia, or acute, which can become intense requiring urgent treatment.

Treatment is surgical in most of the cases, chemotherapy with Imatinib (Glivec) for unresectable tumors, relapse not amenable to surgical treatment or as adjunctive therapy in poor prognosis tumors histologically.
Imaging findings OR Procedure details

CT in the study of GIST.

The computed tomography scan plays an essential role in the study of these tumors, both in diagnosis and during monitoring. Provides information about the location, size, extent, aggressiveness or complications data and are indispensable for assessing response to treatment or relapse detection.

GISTs can occur as solitary lesions or less frequently multiple location subserosa, submucosa or intraluminal. In cases subserosa location extrinsic appear as a mass which moves adjacent structures, while the present submucosal location as intraluminal filling defects rounded crisp. GISTs appear as intraluminal masses that grow toward the light of the digestive tract and can ulcerate and bleed, especially in the case of hypervascular tumors.

A benign GISTs usually show homogeneous density with attenuation values similar to the muscle, showing well defined rounded contours, while the masses heterogeneous lobulated lesions are often more aggressive and may show hypodense areas with or without air-fluid level in relation to cystic necrosis liquefactive. Typically have a diameter greater than 5cm and is often infiltrate adjacent structures. The homogeneous enhancement after administration of intravenous contrast is typical of benign GIST, with frequent heterogeneous peripheral enhancement in the case of evildoers. However, malignant forms may also occur as well defined homogeneous mass, so sometimes indistinguishable from benign.

Liver metastases are commonly hypodense, although hypervascular injuries are not uncommon, but trials in multiple phases are very useful.

To evaluate the response to treatment in the case of tumors treated with chemotherapy, the criteria proposed by Choi (Table 1) have proved more accurate than RECIST criteria. They take into account the attenuation decrease in CT studies intralesional measured in Hounsfield Units after treatment, as response to the same sign as a complement to the variation in size.

We reviewed the cases of GIST who were treated in our hospital during the last ten years (period 2000-2011). During this period have been diagnosed in our center a total of 25 patients, 15 men and 10 women. The mean age at diagnosis was 62 years.

From a clinical standpoint, 20% of patients reported no symptoms at all, while in symptomatic cases, most (76%) showed clinical signs of abdominal tenderness, mild diffuse abdominal pain often intermittent, postprandial fullness, etc. Up to 24% there was a constitutional syndrome diagnosis, with or without abdominal discomfort. The presence of gastrointestinal bleeding, meanwhile, was also a fairly common finding, observed in up to 32% of patients. It is striking that 28% of tumors were detected as incidental finding within scans performed for other reasons.

Regarding the location (Figure 1), the most frequent site of involvement was the stomach (54%), followed by jejunum (30%), ileum (8%), colon (4%) and mesentery (4%). In most cases involved tumors confined to the place of occurrence at the time of diagnosis, showing locoregional lymph node in one case and distant metastases in six (24%), being located in the liver metastases the most frequent.

All patients were treated surgically, combining chemotherapy with Imatinib (Glivec) in 9 cases (36%). Seven of the twenty-five patients (28%) relapsed over this period, most shaped peritoneal metastases (16%) or liver (12%). One case also presented lung metastases, while another was exclusively nodal relapse. Survival during this period has been high, with only three deaths (12%).

As radiological findings (Figure 2), in most cases it was very exophytic tumors that moved adjacent structures (Figs. 1 and 2), of variable size at the time of diagnosis, and the average diameter of 67mm, maximum values and minimum 15mm 260mm (Figures 3 and 4). All cases except one Solitary tumors were cases where independent tumors were observed two along a segment of jejunum (Figure 5 and 6).

Most of the cases showed heterogeneous attenuation (59%), mainly due to the presence of central hypodensity regarding necrosis (Figures 7 and 8). However, the presence of gas (Figures 9 and 10) associated hypodensity areas was very rare, with only one shown case (4%). Heterogeneous enhancement was observed after administration of intravenous contrast (CIV) in 36% of cases, either peripheral or irregular distribution (Figures 11 and 12). Furthermore, the presence of calcifications (Figures 13, 14 and 15) was a find minority observed in four of the 25 cases (16%). Even less frequent findings were suggestive of ulceration, with only two observed cases (8%).

As associated findings highlight the presence of ascites, present in four cases (16%), but we have observed no cases of intestinal obstruction.

In the case of metastases, liver localization as solid lesions were hypodense, in some cases with areas of necrosis or calcification hyperuptake VSD (Figures 16, 17 and 18). Lymph node involvement was observed in lymph nodes suspected of malignancy sized
mesenteric location (Figure 19), whereas metastatic peritoneal implants was as solid in nature that enhanced after contrast administration (Figure 20).

After treatment with Imatinib was evidenced several cases of partial response according to Choi criteria previously exposed, with decreased attenuation of metastatic lesions compared to previous studies (Figures 21, 22, 23, 24, 25, and 26). We have no radiological evidence of any case of complete response.
**Table 1:**

<table>
<thead>
<tr>
<th>Resposta al tratamiento</th>
<th>Definición</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resposta Completa</td>
<td>Desaparición de todas las lesiones.</td>
</tr>
<tr>
<td>Resposta parcial</td>
<td>Disminución de tamaño superior al 10% o disminución de la atenuación en UH (Unidades Hounsfield) de las lesiones superior al 15% en TC.</td>
</tr>
<tr>
<td>Enfermedad Estable</td>
<td>No cumple criterios para el resto. Sin deterioro sintomático atribuible a progresión tumoral.</td>
</tr>
<tr>
<td>Enfermedad Progresiva</td>
<td>Aumento de tamaño superior al 10% sin cumplir criterios de respuesta parcial por la atenuación en TC. Aparición de nuevas lesiones.</td>
</tr>
</tbody>
</table>

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**Gráfica 1.**

- Estomago
- Yeyuno
- Ileon
- Colon
- Mesenterio

**Table 2:** Table 2
Table 3: table3
Fig. 1

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Fig. 16

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Fig. 17

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Fig. 18

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Fig. 26

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Fig. 19

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Fig. 20

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Fig. 21

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Fig. 24

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Fig. 25

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Conclusion

Gastrointestinal stromal tumors are mesenchymal tumors that can affect any segment of the gastrointestinal tract, the mesentery or omentum. Usually appear as well-defined masses exophytic growth, which can be seen frequently contrast enhancement or focal areas of low attenuation.

The location, size of the lesion and other radiological findings, with pathological data, provide diagnostic and prognostic criteria most important, what makes TC is an essential tool in the initial management and follow up of these patients. Choi criteria allow evaluating response to treatment with Imatinib accurately.