Findings in spontaneous intramural intestinal hematoma imaging

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Abstract

Spontaneous intramural hematomas are a very rare cause of acute abdominal pain, but a likely diagnosis in patients undergoing anticoagulation therapy or with underlying hematological disease. Although average onset after beginning anticoagulation therapy is 24.4 months, they may develop as early as 10 days after start of treatment. Clinical symptoms are very broad (e.g. abdominal pain and nausea) and typically similar to those of an intestinal obstruction, but this is not always the case, and diagnostic errors may occur. Treatment of spontaneous intramural hematoma is conservative in most cases, which is why incorrect diagnosis may often lead to unnecessary surgery. Ultrasound imaging, and in particular CT scans, play a key role in early and correct diagnosis of this condition.

Imaging was used to describe finding in 5 patients with acute clinical abdominal pain and spontaneous intramural hematoma diagnosis, a review of the literature was also conducted. Main radiological signs included: thickening of the intestinal wall, intramural hyperdensity on CT without IV contrast, and presence of hemoperitoneum.

Keywords: Hematoma; Spontaneous; Computed tomography scan (CT scan); Ultrasound.

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Introduction

Abdominal trauma is the main cause of spontaneous intramural hematoma and is responsible for up to 90% of cases1. Spontaneous etiology is rare, although the condition can result from excess anticoagulation treatment or be secondary to hematological disease. The condition is more frequent in men than in women, and mean age of clinical presentation is 58 years2.

Spontaneous intramural intestinal hematoma presents in 1 of every 2500 patients undergoing treatment with Warfarin. Incidence in relation to hematological disease is unknown, although hemophilia, leukemia, lymphoma, myeloma and idiopathic immune thrombocytopenia are the main related conditions3,4. Other risk factors include vasculitis, chemotherapy and pancreatitis5,6.

Mean time to clinical onset after beginning anticoagulation therapy is 24.4 months. 2 Nevertheless, it can develop as early as 10 days after beginning treatment.

Spontaneous cases are most commonly located in the jejunum (71.6%), followed by the duodenum (29.8%); however in post traumatic cases, the duodenum is the most common site. 5 Hematomas located in the colon are rare6.

Clinically, spontaneous intramural intestinal hematoma can present a wide array of non-specific signs and symptoms; this is why heightened diagnostic suspicion is important. In 90.7% of cases abdominal pain is present, followed by nausea in 50% and symptoms of intestinal obstruction in 45% of cases5.

Although there is no standardized protocol for treating this condition, consensus exists over an initial, conservative approach: symptoms usually resolve within 4 to 6 days, and disappear entirely after two months. 1.7 In cases caused by excess anticoagulation, treatment includes: discontinuing medication, administering vitamin K and plasma and ultimately, blood transfusions. Surgery is reserved for patients with bowel ischemia, perforation, active intraluminal bleeding, failure of conservative management, diagnostic doubts or late-onset complications, which are infrequent, as are recurrences5,6,8,9. If lesions persist for more than 2 months, other underlying causes must be investigated.

Plain abdominal X-ray and barium swallow lack specificity and only show evidence of intestinal obstruction when present3,10. Up to 92.5% of intramural intestinal hematomas may
show abnormal findings using these methods, without necessarily establishing diagnosis\textsuperscript{11,12}.

Ultrasound imaging is frequently the first tool used to study abdominal pain. Patients with intramural hematoma will present hyperechogenic submucosal thickening in a segment of the gut, with reduced peristalsis. However, this finding is not specific and can occur in other conditions, such as inflammatory bowel disease and infectious or ischemic colitis\textsuperscript{1,3,6,8}.

In any case, use of ultrasound as first approach for evaluation of abdominal pain of unknown origin is still very valuable, and under adequate clinical conditions, should serve as incentive for further testing to confirm its presence.

Abdominal CT scans are the test of choice to diagnose this condition. Symmetrical, hyperdense circumferential thickening of a segment of the gut is the main finding, associated on occasion to intestinal stricture or obstruction\textsuperscript{1,3,6}.

Intraluminal, peritoneal or mesenteric bleeding of the affected bowel loop may also be present.

No clear consensus exists over use of intravenous iodine-based contrast, and some authors claim it can actually mask mural hyperdensity. \textsuperscript{2} Use of oral contrast should be avoided therefore, since it may cause intraluminal bleeding to be overlooked (if contrast is to be administered, water is preferable to radiopaque substances)\textsuperscript{5}.

Degree of intramural hyperdensity will vary with time, and be most intense during the first ten days.

It is important to note that CT scan findings should be interpreted with caution, since they can also be present in other conditions such as inflammatory bowel disease, infections or neoplasia. Nevertheless, if the involved segment measures less than 23 cm and has no associated extramural mass, hematoma is the most likely diagnosis\textsuperscript{6}.

When no histological confirmation is possible, clinical follow up and imaging should suffice to diagnose the condition\textsuperscript{5}.

This paper aims to analyze spontaneous intramural intestinal hematoma cases diagnosed at our center between January 2014 and the present, and describe imaging findings, as well as their correlation to clinical and epidemiological observations.

**Findings**

Between January 2014 and the present, we diagnosed eight cases of intramural hematoma at our center using imaging. Two were secondary to trauma, one to injection of adrenaline to treat upper GI bleeding and the remaining five were of spontaneous origin. The latter were confirmed during follow up, after clinical and imaging findings resolved. Ultrasound and CT data were analyzed and found to be key for diagnosis of this condition in its spontaneous form. Because this was a retrospective analysis, informed consent was not requested; however, data collection and processing was conducted under a specific protocol designed by our Center, following recommendations made by the Clinical Research Ethics Committee, who authorized the study.

Mean age of patients presenting spontaneous intramural hematoma was 76.8 years. From an etiological standpoint, four of the five cases were secondary to anticoagulation complications; only one was caused by an underlying hematological condition, specifically a diffuse large B-cell lymphoma. Mean time to presentation was 23.67 months in patients with anticoagulation problems, the earliest of which presented after 4.8 months. In four cases (80%), spontaneous hematoma was located in the jejunum, the fifth was identified in the ileum (diffuse large B-cell lymphoma patient).

From a clinical standpoint, all patients (100%) presented abdominal pain: of five, three suffered nausea (60%) and two vomiting (40%) (table 1). Two of the five patients (40%) were referred for imaging for suspected intestinal obstruction. In the case of the lymphoma patient, pain was focused in the right upper quadrant, and anemia and thrombocytopenia were detected on complete blood count (CBC).

### Table 1: CT findings in spontaneous intramural intestinal hematoma patients.

<table>
<thead>
<tr>
<th>Patient Nro.</th>
<th>Intramural hyperdensity</th>
<th>Intramural Hounsfield units</th>
<th>Intestinal mesenteric fat hyperdensity</th>
<th>Hemoperitoneum</th>
<th>Intraluminal bleeding</th>
<th>Bowel distention</th>
<th>Location</th>
<th>Length affected (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>44</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Jejunum</td>
<td>10.3</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>46</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Jejunum</td>
<td>11.5</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td>56</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Ileum</td>
<td>6.8</td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>56</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Jejunum</td>
<td>17.8</td>
</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>40</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Jejunum</td>
<td>7.3</td>
</tr>
<tr>
<td>Mean/percentage presentation</td>
<td>100%</td>
<td>48.4</td>
<td>80%</td>
<td>80%</td>
<td>20%</td>
<td>60%</td>
<td>Jejunum 80% Ileum 20%</td>
<td>10.74</td>
</tr>
</tbody>
</table>
Table 2: Spontaneous intramural intestinal hematoma: patient epidemiology.

<table>
<thead>
<tr>
<th>Patient Nro.</th>
<th>Age (years)</th>
<th>Abdominal pain</th>
<th>Nausea</th>
<th>Vomiting of obstruction</th>
<th>Clinical signs</th>
<th>Etiology</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>82</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Anticoagulation</td>
</tr>
<tr>
<td>2</td>
<td>85</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Anticoagulation</td>
</tr>
<tr>
<td>3</td>
<td>69</td>
<td>Yes, focused in the right upper quadrant</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Lymphoma</td>
</tr>
<tr>
<td>4</td>
<td>75</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Anticoagulation</td>
</tr>
<tr>
<td>5</td>
<td>73</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Anticoagulation</td>
</tr>
<tr>
<td>Mean /percentage presentation</td>
<td>76.8</td>
<td>100%</td>
<td>60%</td>
<td>40%</td>
<td>40%</td>
<td>Anticoagulation 80%</td>
</tr>
</tbody>
</table>

Fig 1. Abdominal ultrasound in a spontaneous intramural hematoma patient. (a) Hyperechogenic thickening of the intestinal wall (between crosses) (b) Free floating fluid (asterisk) adjacent to bowel loop, with hyperechogenic thickening of the intestinal wall (between crosses).

Fig 2. (a and b) Axial CT images of two different patients with spontaneous intramural hematoma. Symmetrical, uniform hyperdense circumferential thickening of a bowel wall segment (arrows), compatible with intramural hematoma in both cases.
All five patients were submitted to CT scans without IV or oral contrast; three had been previously examined with ultrasound, two of which presented distended bowel loops and free abdominal fluid with suspended echogenic material. This observation was considered non-specific for diagnosis, and therefore a CT was performed. The remaining case presented echogenic thickening of the intestinal wall with free abdominal fluid, (fig. 1) which also led to a complementary CT scan. All CT scans (100%) revealed symmetrical, hyperdense circumferential thickening of a segment of intestinal wall (fig. 2, table 2). Mean density was 48.4 Hounsfield Units (HU) and average length of intestine affected 10.74 cm. Additionally, four of the five cases (80%) exhibited hyperdense mesenteric fat and free floating fluid in relation to the hemoperitoneum (fig. 3), whereas only one case presented minimal intraluminal bleeding (20%). In three of five patients (60%) CT scan identified small bowel loop distension.

All patients were managed in a conservative manner, and none required surgical intervention. Resolution was confirmed clinically and in follow-up imaging. No case presented recurrence or complications.

**Discussion**

Spontaneous intramural hematoma is a rare cause of acute abdominal pain; no large series of published cases exists given its low, but growing incidence.

Compared to published literature mean age of presentation was considerably higher in our study than in Sorbello et al.2 (76.8 vs. 58 years). However, mean time to presentation from beginning of anticoagulation treatment was similar, as was hematoma location in the Patient’s described and in studies where the jejunum was the segment most often affected1. In line with published literature, abdominal pain was the main debut symptom, followed by nausea and signs of obstruction2. Also in line with published literature the most characteristic ultrasound finding was echogenic thickening of the intestinal wall, and in CT the most common finding was symmetrical, hyperdense circumferential thickening of a segment of bowel wall1,3,5,13. In this study, this CT finding was the most characteristic sign of intramural intestinal hematoma, present in 100% of cases. In addition to these observations, presence of hyperdense mesenteric fat accompanied by bleeding (present in 80% of cases) and hemoperitoneum (80%) were complementary signs that significantly increased diagnostic certainty.

Use of intravenous contrast for studying this pathology remains controversial1,2. In our experience, imaging without contrast is sufficient for correct diagnosis, avoiding unnecessary risks linked to contrast use as well increased radiation exposure.

More importantly, injection of contrast and its absorption by bowel surrounding the hematoma can actually hinder detection of hyperdense wall thickening, which has already been described as key for spontaneous hematoma diagnosis. Our current policy is to only consider its use for cases presenting significant diagnostic difficulty.

Among the spontaneous origin cases, the patient with diffuse large B-cell lymphoma presented certain specific findings in relation to lesion site and symptoms. The hematoma was found in the ileum, with pain in the right upper quad-

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**Fig 3.** Male patient, age 82 years, with spontaneous intramural intestinal hematoma secondary to anticoagulation treatment. (a) Hyperdense free pelvic fluid (arrow), suggesting hemoperitoneum. (b) Symmetrical, hyperdense circumferential thickening of bowel wall segment (arrow) with intramural hematoma and hyperdense reticular mesenteric edema (arrowhead) consistent with intestinal bleeding.
rant. Also, CBC revealed anemia and thrombocytopenia. This patient was the only case presenting intraluminal bleeding. Although these observations were seen in one patient only, they may suggest particular clinical and imaging findings that would assist in the differential diagnosis of other causes of intramural intestinal hematoma. This group of patients should be subject to further investigations.

**Conclusion**

Spontaneous intramural intestinal hematomas are a very rare but increasing cause of abdominal pain. Although the condition does not present with a specific set of symptoms, its presence should be suspected in the right clinical context, specifically in patients receiving anticoagulation therapy or suffering from hematological conditions who present acute clinical abdominal symptoms simulating an intestinal obstruction.

A CT scan without contrast is the diagnostic method of choice for this condition, in which the main finding is symmetrical hyperdense circumferential thickening of the intestinal wall. Additionally, a hyperdense mesentery or presence of hematoperitoneum are additional findings present in a significant number of cases and of great diagnostic value.

**Ethical responsibilities**

Protection of animals and individuals. Authors declare no experiments were conducted in humans or animals during this study. Data confidentiality. Authors declare that institutional study protocols relating to patient data publication were followed. Right to privacy and informed consent. Authors obtained informed consent from patients/individuals referred to in this article. Author for correspondence is in possession of rights to this article.

**Conflict of interest**

Authors have no conflicts of interest to declare.

**References**