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A perforated duodenal ulcer presenting with a subphrenic abscess detected by plain abdominal films and confirmed by MDCT: A case report.

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ABSTRACT

Introduction: Peptic ulcer disease is still the major cause of gastro-intestinal perforation despite major improvements in both diagnostic and therapeutic strategies. While the diagnosis of a perforated ulcer is straightforward in typical cases, its clinical onset may be subtle because of co-morbidites and/or concurrent therapies.

Case presentation: We report a case of a 53-year-old Caucasian male with a history of chronic myeloid leukaemia in maintenance therapy (100 mg/die) with Imatinib (Glivec) who was found to have a subphrenic abscess resulting from a perforated duodenal ulcer which had been clinically overlooked. The patient was febrile (38,5° C) with abdominal tenderness and hypoactive bowel sounds. In the upright abdominal film a huge air-fluid level could be appreciated in the right subphrenic space. In the supine film the extra-luminal air appear to extend to the sub-hepatic space and the hepato-duodenal fossa. At contrast-enhanced multi-detector CT a right subphrenic abscess was clearly depicted. The huge air-fluid collection extended from the subphrenic to the sub-hepatic anterior space. After oral administration of 500 cc of 3% diluted Diatrizoate Meglumine (Gastrografin) an extra-luminal leakage of the water-soluble iodinated contrast media could then be appreciated as a result a perforated duodenal ulcer. At surgery, the abscess was drained and extensive adhesiolysis had to be performed to expose the duodenal bulb where the ulcer was first identified by methylen blue administration and then sutured.

Conclusion: While subphrenic abscesses are well known complications of perforated gastric or duodenal ulcer, they have nowadays become rare thanks to the advances in both diagnostic and therapeutic management of peptic ulcer disease. However, when this latter is not clinically suspected, the contribution of imaging may be substantial.

Keywords: Peptic ulcer disease, Subphrenic abscess, Abdominal plain film, Multi-detector Computed Tomography
Peptic ulcer disease is still the major cause of gastro-intestinal perforation despite major improvements in both diagnostic and therapeutic strategies [1].

The diagnosis of a perforated ulcer is straightforward when an acute onset of epigastric pain is observed in a patient with a known history of peptic ulcer disease [2]. In such instances, radiological investigation is usually limited to plain abdominal films to document the associated pneumo-peritoneum [3].

Less commonly, clinical onset of a perforated gastric or duodenal ulcer may be atypical [4] or subtle because of co-morbidites [5] and/or concurrent therapies [6]. In such cases, the contribution of imaging may be substantial [7-12]. Indeed, CT has been established as the most valuable imaging technique for identifying the presence, the site and the cause of gastro-intestinal tract perforation and this is particularly true since the advent of multi-detector technology [9-12].

Herein, we report a case of a 53 yrs old male patient with chronic myeloid leukaemia who was found to have a huge sub-phrenic abscess due to a perforated duodenal ulcer which had been clinically overlooked for almost two weeks.
A 53-year-old Caucasian male with a history of chronic myeloid leukaemia in clinical remission since 3 years and in maintenance therapy (100 mg/die) with Imatinib (Glivec) was admitted to our hospital to investigate on a persistent fever. He referred the sudden onset of an acute chest pain with epigastric radiation 15 days before hospital admission. At that time, the referring physician excluded an heart origin based on normal ECG findings and cardiac enzyme levels. Three days after, the patient was febrile (38,5°C) and dyspnoic. Laboratory studies revealed an elevated white blood cell count [13 x 10^3/ ml] and a chest-X-ray (not shown) was performed revealing a ill-defined hypo-lucency in the right lower lobe. On the basis of these clinical and radiological findings, a presumed diagnosis of acute bronco-pneumonia was made and the patient was put on a medical therapy with anti-biotic, non steroid anti-inflammatory and proton-inhibitors drugs.

At admission, the patient was febrile (38,5°C) with abdominal tenderness and hypoactive bowel sounds. A plain abdominal film was then performed (Fig. 1). In the upright film (Fig. 1a), a huge air-fluid level was clearly depicted in the right sub-phrenic space. In the supine position the extra-luminal air appear to extend from the right sub-phrenic to the sub-hepatic space and the hepato-duodenal fossa (Fig. 1b). Based on x-ray findings, a contrast-enhanced multi-detector row CT was performed (Aquilion 64, Toshiba, Japan) with a detector configuration of 1 x 32 mm, a table feed of 36 mm/sec and a gantry rotation time of 0.75 (pitch factor = 0.844), 120 kVp and automatic dose modulation. A mono-phasic caudo-cranial acquisition was performed 80 sec. after i.v. bolus injection of 150 cc of non ionic iodinated contrast media (Ultravist 370; Bayer-Shering Pharma, Berlin, Germany) at a rate of 2cc/sec.
At contrast-enhanced MDCT, a right subphrenic abscess was clearly depicted (Fig. 2a-b). The huge air-fluid collection extended from the subphrenic (Fig. 2a) to the peri-hepatic space (Fig. 2b) and extra-luminal air bubbles could also be detected along the fissure of Teres’ ligament (Fig. 2b). On the coronal reformatted image extra-luminal air could also be detected at the level of hepato-duodenal ligament (Fig. 3a) where extra-luminal leakage of the water-soluble iodinated contrast media could be detected (Fig. 3b) after oral administration of 500 cc of 3% diluted Diatrizoate Meglumine (Gastrografin), as a result a perforated ulcer.

The patient underwent immediate surgery. At laparotomy, a huge abscess was found in both the right sub-phrenic and the sub-hepatic space. After drainage, several attempts to identify the site of leakage were made but were unsuccessful because of an inflammatory block involving the lesser omentum, the duodenal bulb, the hepatic flexure and the inferior margin of the left hepatic lobe. After extensive adhesiolysis, the duodenal bulb was finally exposed and the site of the ulcer identified by methylene blue administration through the naso-gastric tube. The ulcer was sutured.

The patient had an uneventful recovery and was discharged 12 days later.
DISCUSSION

Despite recent improvements in both diagnostic and therapeutic strategies of peptic ulcer disease [1], perforated peptic ulcer still represents the major cause of gastro-intestinal perforation and the second most common complication of peptic ulcer disease [2].

When a perforated peptic ulcer is clinically suspected it represents an emergent condition prompting immediate surgery [13]. In these instances, the contribution of imaging is minimal and usually limited to the detection of the associated pneumoperitoneum by abdominal plain film [3].

However, the clinical onset of a perforated gastric or duodenal ulcer may be atypical [4] or the perforative event may be clinically overlooked in presence of co-morbidities [5] or it can be masqueraded by concurrent therapies [6]. In the present case, it can be argued that an anti-inflammatory effect was somehow induced by the multi-kinase inhibitor drug Imatinib which the patient was taking daily since seven years. This maintenance treatment may have led to a very subtle clinical picture which was misdiagnosed as an acute bronco-pneumonia. This was largely based on an erroneous interpretation of abnormal chest-x-ray findings (not shown). While the presence of basal pulmonary infiltrates and/or pleural effusion should be well recognized as an indirect evidence of a sub-diaphragmatic infection [14], this was failed to be appreciated in the present case. As far as the missed diagnosis of the right
sub-phrenic abscess is concerned, we can only argue that its air component had been likely mistaken for the hepatic flexure as in the Chilaiditi’s syndrome despite the absence of haustral folds [15].

Anyway, whenever a perforated peptic ulcer is not clinically suspected the contribution of imaging may be substantial and the diagnostic role of Computed Tomography is undisputed. Indeed, CT has been established as the most valuable imaging technique for identifying the presence, the site and the cause of gastrointestinal tract perforation [7-12]. This is particularly true since the advent of multi-detector technology which allows isotropic data set acquisition resulting in high-resolution images on both the axial as well as the coronal and sagittal planes [9-12].

At CT, diagnosis of alimentary tract perforation can be based on both direct [11-12] and indirect findings [7-10]. Aside from free intra-peritoneal air, direct findings of GI tract perforation include the evidence of discontinuation of the bowel wall and/or the leakage of water-soluble contrast material. The former is now facilitated by the use of thin slice collimations with coronal and sagittal reformations as in multi-detector rows CT [11]. Evidence of bowel wall discontinuity has been found to be more sensitive and accurate than conventional findings such as extra-luminal air, extra-luminal fluid collection and/or bowel wall thickening in the diagnosis of upper gastro-intestinal perforation by using 64-MDCT [12]. As far as the leakage of water-soluble contrast material is concerned, it simply relies on oral administration of iodinated contrast media which, however, is considered a controversial practice in patients with a clinical suspicion of GI tract perforation [7-12].

In our case, the diagnosis of perforated peptic ulcer was indeed based on the leakage of the iodinated contrast material at the level of the duodenal bulb (Fig.3b)
although the evidence of extra-luminal air close to the duodenal bulb (Fig. 3a) could also have been considered highly suggestive of a perforated duodenal ulcer. In the series of Hainaux et al., the evidence of concentrated extra-luminal air bubbles along with other indirect findings such as the peri-visceral fat stranding and the segmental bowel wall thickening has shown a diagnostic accuracy of 86% in the identification of the perforation site [10]. In the present case, however, oral administration of iodinated contrast material was deemed necessary to precisely identify the perforation site in view of a laparoscopic approach which represents nowadays the therapeutic option of choice even in presence of abscesses [13]. Our patient, however, underwent an open laparotomy because of his poor clinical conditions and despite the anatomic details provided by MDCT it was necessary to administer methylene blue through the nasogastric tube to identify the perforated ulcer. This was masked by an inflammatory block involving the duodenal bulb along with lesser omentum, the hepatic flexure of the colon and the inferior margin of the left hepatic lobe.

While most gastro-duodenal perforations will manifest at CT with either direct or indirect findings, there may be cases in which none of them can be detected. Grassi et al. reported that 12 out of 146 (8.2%) cases of surgically proven gastro-duodenal perforations had negative CT findings [4]. In such cases, a self-sealed perforation site or a perforation contained by adjacent organs can be postulated [8].

More commonly, the perforation may be clinically silent and lead to the formation of abscesses in the peritoneal cavity. Indeed, abscesses were found in 2 out of 10 patients (20%) with proximal gastro-intestinal perforation [7] and in 12 out of 73 patients (16%) with gastro-intestinal perforation [9].

In the present case, the diagnosis of a subphrenic abscess was prompted by abnormal abdominal plain film findings (Fig. 1) and then confirmed by contrast-
enhanced MDCT (Fig. 2). As far as the former are concerned, while the huge air-fluid level depicted in the right subphrenic space (Fig. 1a) could prospectively be considered consistent with a subphrenic abscess [14], the supine film only retrospectively pointed to the correct diagnosis of a perforated duodenal ulcer since the extra-luminal air could be traced back to the hepato-duodenal legament through the sub-hepatic space (Fig. 1b). However, since the diagnosis of duodenal ulcer was not even clinically suspected, a contrast-enhanced MDCT had to be performed.
CONCLUSIONS

We have herein reported a case of perforated duodenal ulcer complicated by a right subphrenic abscess first revealed by abdominal plain film and then confirmed by contrast-enhanced MDCT. While subphrenic abscesses are well known complications of perforated gastric or duodenal ulcer, they have nowadays become rare thanks to the advances in both diagnostic and therapeutic management of peptic ulcer disease.

Although a very similar case has been recently reported in the literature [6], in the present case the diagnosis was prompted by abnormal abdominal plain film findings which, in the current era of multi-detector CT technology, many radiologists and most clinicians are no longer familiar with.
CONSENT SECTION

Written informed consent was obtained from the patient for publication of this manuscript and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

COMPETING INTERESTS

The authors declare that they have no competing interests.
REFERENCES


AUTHOR’S CONTRIBUTION SECTION

L. C. observed the case and revise the manuscript
M.C. was responsible of the manuscript drafting
V. R. performed literature research
F.S. was the referring physician
P.P. performed literature research
M.C. performed laparotomy
G. R. performed laparotomy
M. S. was responsible of the manuscript editing

All authors read and approved the final manuscript.
LEGENDS

**Figure 1:** Abdominal plain films obtained in the upright (A) and supine position (B). In A a huge air-fluid level is depicted in the right sub-phrenic space. In B the extra-luminal air appears to extend from the peri-hepatic (asterisk) to the sub-hepatic space (arrow-heads). Extra-luminal air can also be appreciated in the hepato-duodenal fossa (arrow) pinpointing the perforated duodenal ulcer.

**Figure 2:** Multi-detector contrast-enhanced CT. Axial scans at the level of the upper abdomen are shown. In A a huge air-fluid collection (asterisk) is depicted in the right sub-phrenic space with mild stranding of the surrounding fat (arrow). There are also a reactive pericardial and pleural effusions, the latter with associated atelectasia of the right lung base (arrow-heads). In B the air-fluid collection (asterisk) appears to extend to the peri-hepatic space. Extra-luminal air bubbles can also be detected along the fissure of Teres’ ligament (arrow).

**Figure 3:** Multi-detector contrast-enhanced CT. Coronal reformatted images obtained before (A) and after (B) oral administration of 500 cc of 3% diluted Diatrizoate Meglumine (Gastrografin) are shown. In A extra-luminal air is depicted in the peri-hepatic space (asterisk) as well as in the hepato-duodenal ligament (arrow). The fluid component of the abscess (circle) can also be detected beside the gall-bladder. In B the extra-luminal leakage of the water-soluble iodinated contrast media can be well appreciated at the level of the hepato-duodenal ligament (arrow-head) in place of the extra-luminal air.