World Journal of Gastroenterology

Online Submissions: http://www.wjgnet.com/1007-9327office
wjg@wjgnet.com
doi:10.3748/wjg.v16.i18.2314

World J Gastroenterol 2010 May 14; 16(18): 2314-2316
ISSN 1007-9327 (print)

CASE REPORT

Radiological diagnosis of duodenocaval fistula: A case report and literature review

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Received: January 17, 2010 Revised: February 20, 2010
Accepted: February 27, 2010
Published online: May 14, 2010

Abstract

Duodenocaval fistula (DCF) is an uncommon but lethal clinical entity. The high mortality has been attributed to the difficulty of diagnosis before attempts at definitive therapy. In this case report, we describe a patient with a series of computed tomography (CT) examinations over a 2-mo period in hospital. A low-density air bubble appeared in the inferior vena cava (IVC) on the second day in hospital and became clear on day 19, and gradually enlarged. Magnetic resonance imaging (MRI) also clearly demonstrated a high-signal enteric contrast medium or thrombus and signal-void air bubbles in the IVC. However, cavography did not show the filling defect. We suggest that noninvasive CT and MRI should be chosen as a first-line investigation, and IVC, including the surrounding structures, should be carefully reviewed on images if DCF is clinically considered.

Key words: Duodenocaval fistula; Computed tomography; Magnetic resonance imaging

Peer reviewer: Martin D Zielinski, MD, Department of Trauma, Critical Care and General Surgery, Mayo Clinic, 1216 2nd St Sw, Rochester, MN 55902, United States

Guo Y, Zhang YQ, Lin W. Radiological diagnosis of duodenocaval fistula: A case report and literature review. *World J Gastroenterol* 2010; 16(18): 2314-2316 Available from: URL: http://www.wjgnet.com/1007-9327/full/v16/i18/2314.htm DOI: http://dx.doi.org/10.3748/wjg.v16.i18.2314

INTRODUCTION

Duodenocaval fistula (DCF) is an uncommon but lethal clinical entity that has previously been reported in only 39 patients in the English-language literature[1-9]. The high mortality of 41% (16/39) has been attributed to the difficulty of diagnosis before attempts at definitive therapy. We present a case of DCF that underwent a series of endoscopy, computed tomography (CT), magnetic resonance imaging (MRI), and cavography examinations, and a review of the literature with respect to radiological manifestation of DCF.

CASE REPORT

A 78-year-old man was hospitalized because of right-sided abdominal pain for 1 mo, associated with fever, rigors, and chills for 1 d. His medical history was significant for right nephrectomy 5 years ago because of renal cell carcinoma. A mass was found in the right adrenal gland and gamma knife radiotherapy was performed 10 mo ago. On physical examination, his initial vital signs were temperature 39.5℃, heart rate 120 beats/min, blood pressure 110/70 mmHg, respiration 25 breaths/min, and SaO_2 97%. Initial laboratory studies showed a leukocyte count of 22 × 10^9/L, hemoglobin 80 g/L, platelet count 33 × 10^9/L, and normal blood chemistry, clotting parameters, and liver function tests. Blood cultures revealed *Enterococcus faecium* and *Enterobacter cloacae* bacteremia and *Candidia albicans* fungemia. Treatment with intravenous broad-spectrum antibiotics and antifungal

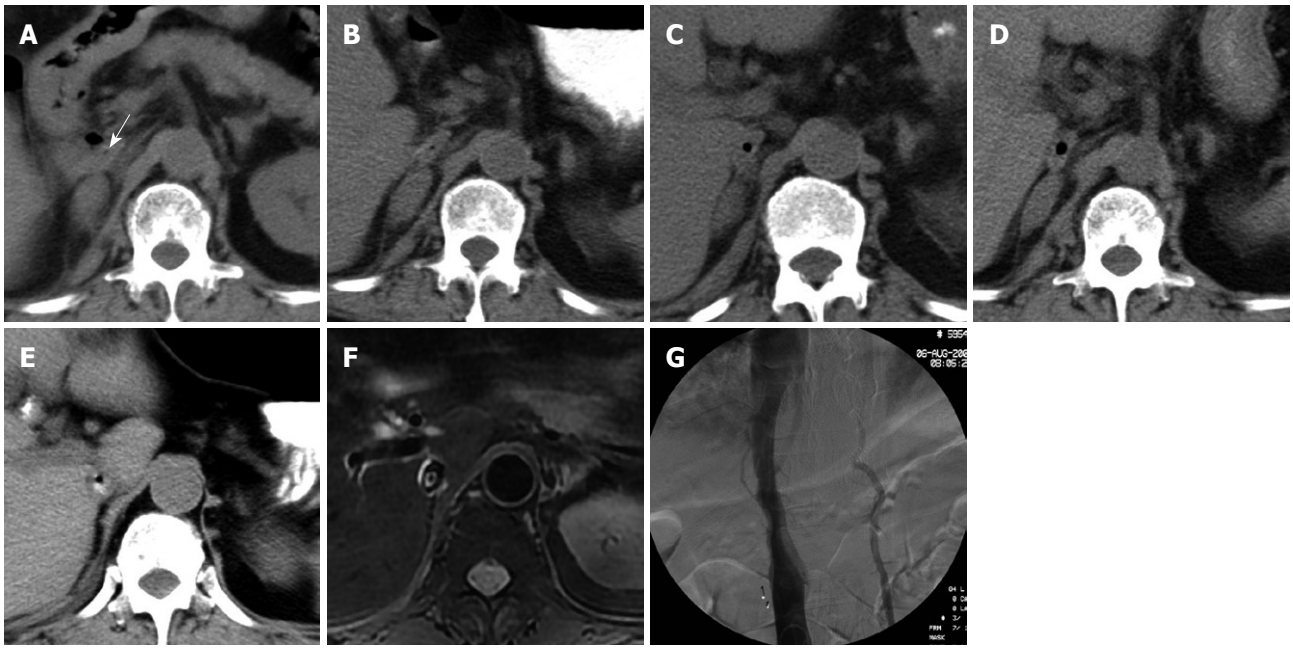

Figure 1 During the 2-mo hospital stay, a small, low-density air bubble appeared in the inferior vena cava (IVC) and gradually enlarged on follow-up computed tomography (CT) scans. Enteric contrast medium leaked into the IVC. Magnetic resonance imaging (MRI) clearly demonstrated the high-signal enteric contrast medium or thrombus and signal-void air bubbles. Cavography did not reveal the thrombus in the IVC. A: CT scan on the second hospital day. A low-density dot loomed up in the IVC (arrow). A mass in the right side adrenal gland was also seen; B: CT scan on the 19th hospital day. The low-density dot became more evident; C, D: CT scan on the 59th and 67th hospital day. The low-density dot (air bubble) was gradually enlarged; E: CT scan on the 73rd hospital day with water-soluble enteric contrast demonstrated air bubble surrounded by contrast medium in the IVC; F: MRI T2WI on the 74th hospital day demonstrated the high signal enteric contrast medium or thrombus and signal void air bubble in the IVC; G: Inferior vena cavogram on the 75th hospital day showed no evident thrombus in the IVC.

therapy (meropenem and caspofungin) resulted in some improvement. However, during the 76 d in hospital, the patient developed intermittent fever, high leukocyte count, sepsis and fungemia. About 1 mo after admission, the patient had watery stools, which were positive for occult blood. A series of upper gastrointestinal (GI) endoscopy examinations, abdominal ultrasound, CT, MRI and inferior vena cavography were performed during the hospital stay. Upper GI endoscopy (on day 3 in hospital) revealed a giant ulcer in the second portion of the duodenum, but no active bleeding. Abdominal ultrasound found nothing except a mass in the right adrenal gland. A series of abdominal CT scans were performed on days 2, 19, 59, 67 and 73 in hospital (Figure 1). Low-density air bubbles were incidentally found in the inferior vena cava (IVC) (at the level of the first lumbar vertebra, adjacent to the duodenum) by CT on day 67. A review of the previous CT scans showed a low-density dot in the IVC on the second day in hospital, which became clear on day 19, and gradually enlarged. A repeat abdominal CT scan (day 73) with water-soluble enteric contrast demonstrated low-density air bubbles surrounded by high-density contrast medium or thrombus in the IVC, which suggested DCF. T2-weighted MRI (day 74th day of hospitalization, Figure 1) revealed high-signal enteric contrast medium or thrombus and signal-void air bubbles in the IVC. However, inferior vena cavography (day 75 of hospitalization) showed no evidence of IVC thrombus (Figure 1). Surgical consultation was scheduled but before it could be performed, the patient had an episode of hematemesis. Massive hemorrhage ensued and the patient died despite aggressive resuscitation efforts. Postmortem examination revealed a fistula between the second portion of the duodenum and the IVC.

DISCUSSION

DCF is a rare occurrence that typically arises as a complication from migrating IVC filters, peptic ulcer disease related to retroperitoneal tumor resection in association with radiation therapy, or transmural migration of ingested foreign bodies. Diagnosis of this entity is challenging because of the nonspecific nature of the symptoms and is rarely made before laparotomy or autopsy. The most common presentations of DCF are sepsis and GI hemorrhage. Sepsis is generally polymicrobial in origin, and caused by Gram-positive and Gram-negative enteric bacteria in the systemic circulation. Fungemia may also occur, as in the present case[1-9]. Endoscopy typically discloses a duodenal ulcer that may show visible bleeding, but the extent of penetration of the ulcer is often underappreciated[1]. CT provides noninvasive evaluation of the IVC and the adjacent structures. It is capable of detecting thrombus and air bubbles in the IVC, infectious fluid collection or abscess around the IVC and duodenum, incarcerated foreign bodies, and migrated caval filters[1-4]. CT correctly can identify DCF in approximately 50% of patients[2]. In this case, a low-density dot appeared in the IVC on the second day in hospital, became clear on day 19, and gradually enlarged over the 2-mo hospital stay. Air bubbles in the IVC may have been produced by bacteria or pushed in by gut peristalsis. Repeated CT

examinations are necessary when air bubbles are too small to make a diagnosis. For detecting thrombus in the IVC, enhanced CT is essential. MRI was not used for the diagnosis of DCF in previous studies. With conventional or flow-sensitive sequences, MRI can clearly delineate thrombus in the IVC, even without intravenous contrast medium[10,11]. Thrombus, intestinal contents and enteric contrast show abnormal signals against signal-void blood flow in the IVC. In the present case, MRI clearly demonstrated high-signal enteric contrast medium or thrombus and signal-void air bubbles in the IVC. Cavography has revealed thrombus or filling defects in the IVC, but was diagnostic of DCF in only two out of six cases[1,4,12]. In the present case, cavography did not show enteric contrast medium or thrombus in the IVC. The most likely reason was that the thrombus was flushed out by the high-pressure injection of intravenous contrast medium. Fatal pulmonary embolization composed of intestinal contents through a DCF has been reported[13]. Our patient died of hematemesis 24 h after cavography. Therefore, care should be taken to perform invasive cavography to detect unstable thrombus of DCF in the IVC.

In summary, we report this case to remind clinicians that noninvasive CT and MRI should be chosen as a first-line investigation for diagnosis of DCF. If DCF is clinically considered, IVC and the surrounding structures should be carefully reviewed by imaging.

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S- Editor Wang YR **L- Editor** Kerr C **E- Editor** Lin YP