Int J Colorectal Dis (2009) 24:1353–1354
DOI 10.1007/s00384-009-0706-2

LETTER TO THE EDITOR

Consecutive cecum perforation due to incarcerated diaphragmatic hernia after liver surgery

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Accepted: 2 April 2009 / Published online: 28 April 2009

Dear editor:

Elective liver surgery has become safe and feasible in the recent decades. Nevertheless, biliary leakages or strictures, hepatic insufficiency or abscess formation, vascular complications, pleural effusion, and thromboembolic events are most feared early postoperative complications.

Cecum perforation caused by bowel herniation through a defect of the right diaphragm after hepatic surgery is a very rare, most likely long-term complication that should be immediately diagnosed and treated surgically.

A 67-year-old man was admitted suffering from epigastric pain for 5 days. Additionally, he reported distension of the abdomen, constipation, and spasmodic hiccup. Three years before, a carcinoma of the sigmoid colon and synchronic hepatic metastasis were diagnosed. Therefore, he underwent open rectosigmoid resection followed by chemotherapy according to FOLFOX4 pattern. After partial remission of the hepatic metastasis, right hemihepatectomy was performed. Having multiple pulmonary metastases in late 2005, chemotherapy to SALTZ pattern was once more performed. After stable disease until December 2006, palliative second-line chemotherapy (FOLFIRI pattern) was started.

Clinical examination revealed a diffuse painful and meteoristic abdomen with local tenderness in the right upper abdomen, decreased bowel sounds, and moist rales in the lower chest. Furthermore, the patient presented with typical signs of septic status, as leukopenia, arterial hypotension, and tachycardia were seen.

Due to suspicion of transdiaphragmatic herniation in the chest X-ray, computed tomography (CT) was performed that revealed a right-sided enterothorax with a broad hint of colonic incarceration in the diaphragm, accompanied by cecum distension.

An immediate emergency operation was carried out with resection of the right hemicolon. The cecum was perforated and partially necrotic due consecutive distension while right colonic flexure was incarcerated in the right diaphragm. The diaphragmatic defect was situated in right anterior aspect of the caval vein in the central tendon of the diaphragm and was closed by running suture.

Undergoing several reoperations including side-to-side ileotransversostomy and abdominal wall reconstruction, final closure could be performed 26 days after emergency surgery. The patient recovered well and was discharged from the hospital after 45 days.

Of all diaphragmatic hernias, the incidence of right diaphragmatic hernia is about 11–14%. Spontaneous non-traumatic ones are very rare. Typical reasons are blunt or penetrating injuries on one hand. On the other hand, congenital defects of the diaphragm are basic causes. Transdiaphragmatic herniation after hepatic surgery, however, is rarely reported. A few cases have described this entity after liver transplantation or right living donor hepatectomy.

A possible reason for the diaphragmatic defect could be a thermal damage of the diaphragm caused by an argon beamer or any other surgical instrument used for liver resection the patient underwent prior. Diaphragmatic heat lesions have also been described after high-frequency ablation of hepatic tumors. Those lesions could evolve into an enlarging defect, caused by the different pressure levels

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in the abdominal and thoracic cavity or by constant motion of the diaphragm.

Symptoms of our patient were postponed nearly 2 years after liver surgery and are typical for an acute abdomen with local tenderness in the right upper abdomen because the right colon was incarcerated.

Symptoms of diaphragmatic herniation are dependent on whether structures are incarcerated or displaced into the thoracic cavity. They range from dyspnea, abdominal, and pleural pain up to severe septic conditions. Delay of symptoms can vary from days to years. In the absence of incarceration, the symptoms can be missed. As in this case, the onset of symptoms is usually sudden.

Most defects of the diaphragm are diagnosed by laparotomy performed to investigate other major abdominal lesions. In our case, diagnoses was assumed after a plain X-ray of the chest and approved by a CT scan showing incarcerated colon in the thorax. Cecum perforation was only assured during the surgical exploration of the intestine.

Plain chest X-ray can lead to misdiagnosis because hernia can mimic a pneumothorax, pleural effusion, or lower lobe pneumonia. One case is reported whereby transdiaphragmatic herniation of the liver was not to be distinguished from lung cancer in a CT scan.

The recommended surgical treatment of symptomatic diaphragm hernia is closure using single or running suture techniques and artificial patches performed by an open or laparoscopic approach, respectively.

In conclusion, liver resection can cause traumatization of the diaphragm followed by transdiaphragmatic herniation with an enterothorax and should be considered as a potential complication of liver surgery. The onset of symptoms can be delayed. Other potential risk factors for this rare complication like chemotherapy, malnutrition, or malignant disease need further evaluation. Indication and time frame for surgical intervention are dependent on the clinical symptoms, status, and diagnostic findings and should be discussed in the individual patient.