

## Intrathoracic cancer of the splenic flexure

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Received: 7 September 2006 / Accepted: 27 November 2006 / Published online: 21 December 2006  
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**Abstract** Blunt traumatic rupture of the diaphragm is a well known but uncommon event of thoracoabdominal traumatic injuries. It occurs in 1–5% of polytrauma patients and requires a high degree of suspicion for a rapid diagnosis. The frequency of delayed diagnosis is difficult to be estimated and up to 30% of blunt diaphragmatic ruptures present late. A case of herniated splenic colic flexure through a defect in the left hemidiaphragm and the subsequent development of colon cancer in this area are presented. We emphasize the importance of making a prompt diagnosis in order to avoid further morbidity and mortality in this rare clinical entity.

**Keywords** Chest pain · Chest wall infiltration · Splenic flexure cancer · Blunt diaphragmatic rupture

### Introduction

Carcinoma of the splenic flexure is uncommon, representing 2–5% of all colorectal cancers [1]. Signs and

symptoms of this clinical condition are vague and usually non-specific.

Blunt traumatic rupture of the diaphragm is a well known but uncommon complication, occurring in 1–5% of polytrauma patients [2]. The diagnosis of this traumatic entity requires a high degree of suspicion in order to avoid the appearance of subsequent serious complications [3].

In this case report, we present the development of cancer in the splenic flexure of the colon after its herniation through a traumatic left diaphragmatic defect.

### Case report

A 66-year-old man was admitted to the hospital with 1 week history of left-sided chest pain, increasing in duration. He was treated with non-steroidal anti-inflammatory drugs (NSAID) medication. Non-productive cough with no fever was reported. There was a 5-month history of constipation and weight loss. He was being attended at the hospital because of worsening symptoms, especially those of chest pain.

From his past history, there was a conservatively treated episode of upper gastrointestinal (GI) bleeding and a road traffic accident with multiple fractures in the upper and low extremities approximately 20 years ago.

At the patient's admission, his white cell count was 11.4 k/ $\mu$ l, hemoglobin 11.8 g/dl, hematocrit 33.2%, and his carcinoembryonic antigen (CEA) was 43.1 U/ml. Chest X-ray showed a shadowing of the middle and lower zones, suggesting a herniated segment of the large bowel into the chest (Fig. 1).

A following computed tomography (CT) scan showed both left colic flexure and part of the descending colon entering into the thorax as a result of a deficit

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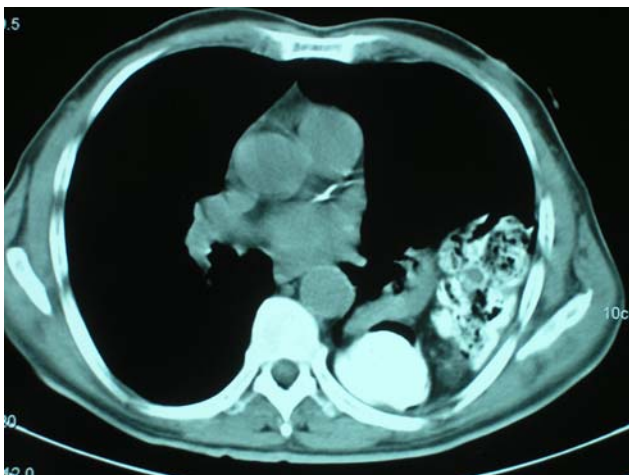
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**Fig. 1** Plain anteroposterior film: shadowing in the left lower zone is due to the herniated viscera into the chest

in the left hemidiaphragm. A neoplastic mass was also observed in the herniated large bowel, along with pericolic fat, lymphadenopathy, and some swelling of the chest wall muscles around the lesion (Fig. 2). A bone scintigraphy was positive, affecting the 7th, 8th, and 9th ribs on the left side.

A left thoracoabdominal incision was performed. The spleen, the greater omentum, the left colic flexure, and part of the descending colon were found to be protruded into the left thoracic cavity. A neoplastic mass, which infiltrated the chest wall, was located on the left colic flexure. The lesion was detached from the chest wall and was removed, along with a part of the parietal pleura. A left hemicolectomy was performed and a PTFE patch was placed in the diaphragmatic defect.



**Fig. 2** Computed tomography (CT) scan of the thorax, suggesting the infiltration of the chest wall and the herniated viscera into the chest cavity: stomach, omentum, and large bowel

The postoperative course was uneventful and the patient was discharged on the 8th postoperative day.

The histological report revealed a differentiated moderately adenocarcinoma of the colon, stage B2 (Dukes classification), and the patient underwent neo-adjuvant chemo-radiotherapy. The patient is free of disease after 2 years followup.

## Discussion

Blunt traumatic rupture of the diaphragm is a well known but uncommon situation. It occurs in 1–5% of polytrauma patients. Diaphragmatic blunt trauma may produce large deficits, often more than 10 cm in diameter. The early diagnosis of blunt diaphragmatic disruption can be difficult in the absence of respiratory distress and massive visceral herniation [2–4].

Up to 30% of blunt diaphragmatic ruptures present late [2, 4]. Patients may be asymptomatic or have chronic abdominal and/or chest symptoms from traumatic injury after a variable time interval. Undiagnosed diaphragmatic ruptures can lead to severe complications, such as respiratory insufficiency (due to rapid increase of the volume of the herniated viscera in the chest), hypotension, gastrointestinal obstruction, or strangulation [3, 4]. The incidence and the natural history remain unknown, since some patients are asymptomatic for years after injury. In our patient, the diagnosis took place 18 years later on. The cause was considered to be the traumatic rupture of the diaphragm and the development of colon cancer at the herniated splenic flexure was the subsequent event.

The left diaphragm is ruptured more frequently (up to 65% of all cases), while the right diaphragm appears to be protected by the ability of the liver to absorb the pressure built up in this area [4, 5].

Among the organs that are more frequently dislocated, the stomach is the most commonly herniated, followed by the colon—especially the transverse colon—and spleen [6].

The splenic flexure is an uncommon site for carcinoma of the colon, varying from 3% to 5% of all colorectal cancers [2].

It is obvious that the combination of blunt diaphragmatic rupture and the subsequent development of cancer into the herniated splenic flexure, as we presented, is an extremely rare clinical entity which clearly indicates how important early diagnosis is for the patient.

Splenic flexure cancer, resected by left partial colectomy or partial resection of the transverse/descending colon, is not associated with worse prognosis [7, 8]. For this reason, early recognition of

diaphragmatic rupture represents a significant clinical challenge. Knowledge of impact mechanisms that produce injury along with information regarding the seat position of the injured and the direction of the impacting force are essential for the surgeon to suspect diaphragmatic rupture [3].

Only 25–49% of initial radiographs are diagnostic of diaphragmatic rupture. Additional serial examinations, oral contrast, radiopaque, nasogastric tubes, and fluoroscopy are all important diagnostic workup to recognize early diaphragmatic ruptures [9].

Video-assisted thoracoscopy (VAT) techniques have been used for the evaluation of thoracoabdominal trauma with success, helping the surgeon to have a clear image of the thoracic cavity [10]. Additionally, laparoscopy has an important role in the diagnosis and treatment of diaphragmatic ruptures. Generally, minimally invasive surgery allows adequate visualization of the herniated viscera. The high incidence of associated abdominal injuries (75–89%) gives laparoscopy the priority over thoracoscopy. Thus, the laparoscopic procedures could be used successfully as an alternative method for the treatment of diaphragmatic rupture [11].

## Conclusion

Our case underlines the importance of the early diagnosis of diaphragmatic injuries. Early detection reduces potential complications.

## References

1. Aldridge MC, Phillips RKS, Hittinger R, Fry JS, Fielding LP (1986) Influence of tumour site on presentation, management and subsequent outcome in large bowel cancer. *Br J Surg* 73(8):663–670
2. Meyers BF, McCabe CJ (1993) Traumatic diaphragmatic hernia. Occult marker of serious injury. *Ann Surg* 218(6):783–790
3. Reber PU, Schmied B, Seiler CA, Baer HU, Patel AG, Büchler MW (1998) Missed diaphragmatic injuries and their long-term sequelae. *J Trauma* 44(1):183–188
4. Maddox PR, Mansel RE, Butchart EG (1991) Traumatic rupture of the diaphragm: a difficult diagnosis. *Injury* 22(4):299–302
5. Kearney PA, Rouhana SW, Burney RE (1989) Blunt rupture of the diaphragm: mechanism, diagnosis, and treatment. *Ann Emerg Med* 18(12):1326–1330
6. Kaulesar Sukul DMKS, Kats E, Johannes EJ (1991) Sixty-three cases of traumatic injury of the diaphragm. *Injury* 22(4):303–306
7. Nakagoe T, Sawai T, Tsuji T, Tsuji T, Jibiki M, Ohbatake M, Nanashima A, Yamaguchi H, Yasutake T, Kurosaki N, Ayaabe H, Ishikawa H (2001) Surgical treatment and subsequent outcome of patients with carcinoma of the splenic flexure. *Surg Today* 31(3):204–209
8. Gervaz P, Buhler L, Scheiwiller A, Morel P (2003) A tale of two colons and two cancers. Distinct carcinogenesis and clinical outcome according to location proximal or distal to the splenic flexure. *Swiss Surg* 9(1):3–7
9. Nau T, Seitz H, Mousavi M, Vecsei V (2001) The diagnostic dilemma of traumatic rupture of the diaphragm. *Surg Endosc* 15(9):992–996
10. Divisi D, Battaglia C, De Berardis B, Vaccarili M, Di Francescantonio W, Salvemini S, Crisci R (2004) Video-assisted thoracoscopy in thoracic injury: early or delayed indication? *Acta Biomed Ateneo Parmense* 75(3):158–163
11. Matthews BD, Bui H, Harold KL, Kercher KW, Adrales G, Park A, Sing RF, Heniford BT (2003) Laparoscopic repair of traumatic diaphragmatic injuries. *Surg Endosc* 17(2):254–258