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Case Report

Never seen right gastrothorax: A case report

Richard Ghandour[a,*], Sarkis Ejbeh[c], Pierre Maalouf[d], Fadlo Sayegh[e], Shafica El Masri[f], Hadi El Assaad[g], Elie Moussa[g], Frederic Adaimi[b]

[a] General Surgery Resident, Notre Dame University Hospital, Jounieh, PO Box 7, Lebanon
[b] Head of the General and Vascular Surgery Department, Notre Dame University Hospital, Jounieh, Lebanon
[c] Head of the Cardiothoracic Surgery Department, Notre Dame University Hospital, Jounieh, Lebanon
[d] General Surgeon, Notre Dame University Hospital, Jounieh, Lebanon
[e] Head of the Anaesthesia and Reanimation Department, Notre Dame University Hospital, Jounieh, Lebanon
[f] Anaesthesia and Reanimation Resident, Notre Dame University Hospital, Jounieh, Lebanon
[g] Medical Student. General Surgery Intern, Notre Dame University Hospital, Jounieh, Lebanon

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ABSTRACT

Traumatic gastrothorax, or stomach herniation into the chest post-trauma, is a rare but dangerous condition that can lead to respiratory distress and obstructive shock. Its diagnosis is challenging and requires a high index of suspicion. Immediate stomach decompression is an important, often life-saving step of the treatment, prior to definitive surgical repair.

We report herein the case of a 59 year-old female patient, who was involved in a severe motor vehicle accident resulting in multiple injuries. Her right-sided gastrothorax, manifesting as solely nausea at first, was only diagnosed 16 days after trauma, intraoperatively. Worse, her herniated stomach had ruptured within the right pleural cavity causing pneumothorax, spillage of contents and pleuritis. It was an erroneous radiological diagnosis of right lung necrosis which halted surgical management. Right gastrothorax has never been reported previously.

This article also reviews the condition's pathophysiology, along with diagnostic and therapeutic modalities, and sheds light on the importance of its early recognition and treatment.

Case Report

A 59-year-old housewife, who was the unrestrained driver involved in a severe head-on motor vehicle crash (no airbags), was extricated and brought to our emergency department. Investigations revealed a right (R) forehead complex wound, a negative total body computed tomography (CT) scan and a left (L) ankle fracture; she was consequently admitted. The next day (D1) she had severe left lower quadrant pain and a three-unit hemoglobin drop; mesenteric bleeding was suspected on repeat CT scan: emergent lower midline laparotomy identified bleeding with necrosis of a 15 cm ileal segment. Resection and primary anastomosis were performed.

On D4 she had nausea, and in-bed chest x-ray (CXR) (Fig. 1A) showed a R gastrothorax, mistaken for gastric distension and interposition between the liver and the R hemidiaphragm; A nasogastric (NG) tube was inserted. The tranquilizing ensuing clinical relief delayed the next CXR (Fig. 1B) till D10 (by which time she had her orthopaedic surgery and facial wound reconstruction) when she had dyspnea: NG tube curving back into R hemithorax. This was misread likewise, liquid diet was started and NG tube was removed. On D11, she had respiratory distress with PaO2 = 54 mmHg. She had no R air entry on auscultation. Pleural effusion and a pneumothorax were confirmed on CT (Fig. 1C). After chest tube insertion and transfer to intensive care unit, she had clinical and

* Corresponding author.
E-mail address: Richard.ghandour@hotmail.com (R. Ghandour).

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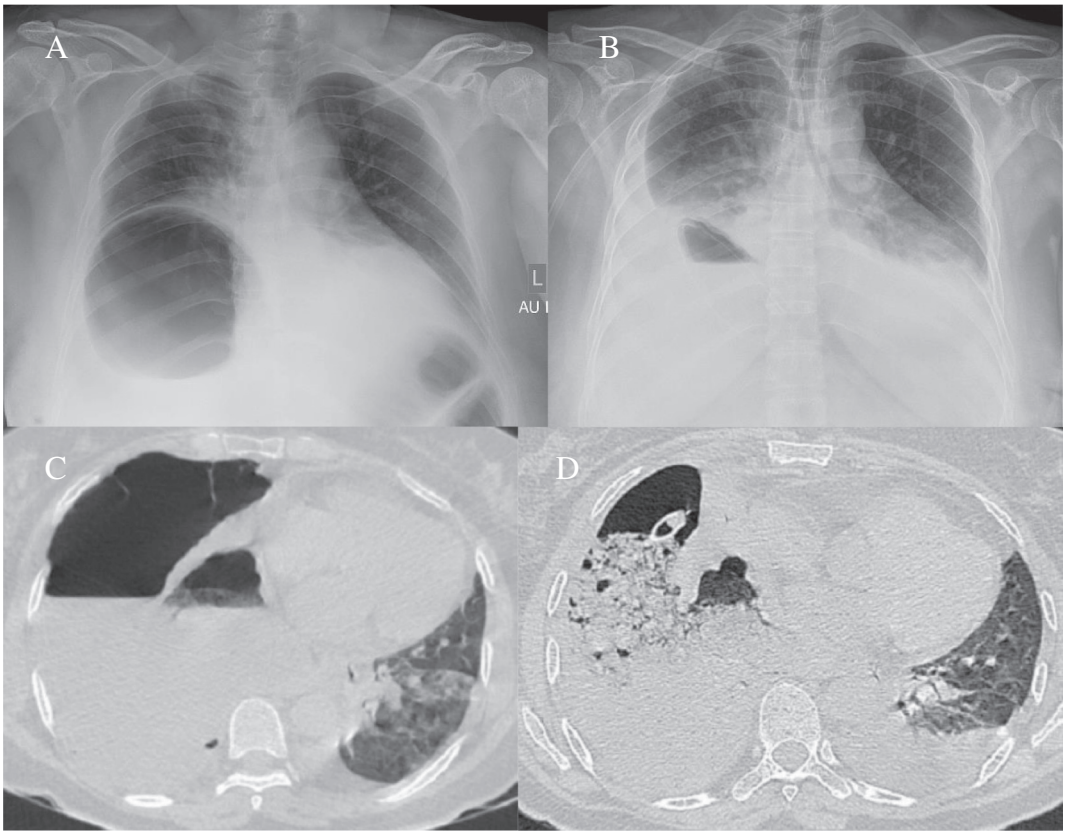

Fig. 1. Remarkable imaging. A: in-bed chest X-ray on D4; B: chest x-ray on D10; C: computed tomography scan of the chest on D11; D: computed tomography scan of the chest on D14.

radiological improvement. Diet was progressively resumed.

On D14, she had orthopnea with desaturation (80%) when supine. Biology revealed doubling leucocytosis (to 32,600 / mmˆ3) and CT (Fig. 1D) was misinterpreted as lung necrosis. A second chest tube returned debris that were submitted to culture. The next day, drains still returned high-output of pinkish fluids with debris, and the patient still complained of dyspnea without improvement. Repeat CT showed a similar image with suspected empyema. R thoracotomy was decided upon.

On D16, culture grew *Escherichia coli*, and thoracotomy was performed to find out visceral pleuritis, pseudomembranes and fibrosis, with collapsed R lung upwards, an ill-defined (communicating with the esophageal hiatus) posterior diaphragmatic defect and a perforated stomach in the R hemithorax. After reduction, the stomach, that showed a 12 cm longitudinal perforation without signs of necrosis or ischemia (Fig. 2), was primarily repaired in 2 layers of Vicryl 0 through a midline laparotomy (xiphoid-pubis). After decortication and toilet, the diaphragmatic defect was repaired by imbrication via thoracotomy, with a very difficult exposure, worse abdominally.

Thereafter, the patient had a full recovery. She was discharged on D27. Upper GI series on follow-up (D34) displayed the stomach in place with normal contrast transit.

Discussion

Post-trauma gastrothorax is a rare, yet life-threatening condition, defined as a distended stomach herniating into the thorax through a traumatic diaphragmatic defect. Clinical manifestations range from epigastric pain, retching, fever and cough to respiratory failure and obstructive shock.

Pathophysiology involves a sequence of stomach herniation and filling (with air, fluid or food) through a one-way valve mechanism created by: abnormal angulation of the GEJ, combined with gastric outlet obstruction at the level of the diaphragm. The filled stomach may exert a positive mass effect on the mediastinum, thus defining a tension gastrothorax [1].

On CXR [2], a gastrothorax is described as a large air-filled structure +/− fluid level often in L hemithorax, with a mediastinal shift. It is distinguished from a pneumothorax by the presence of a superior rim (compressed ipsilateral lung + stomach wall), the lack of a stomach bubble in the left upper quadrant and a poorly defined ipsilateral hemidiaphragm (Fig. 2A). An NG tube that curves back into the chest is confirmatory. Use of a decubitus film (that may demonstrate layering of gastric contents) [3] or of oral contrast might be helpful. CT and MRI (magnetic resonance imaging) are more sensitive imaging though not suitable for emergency situations.

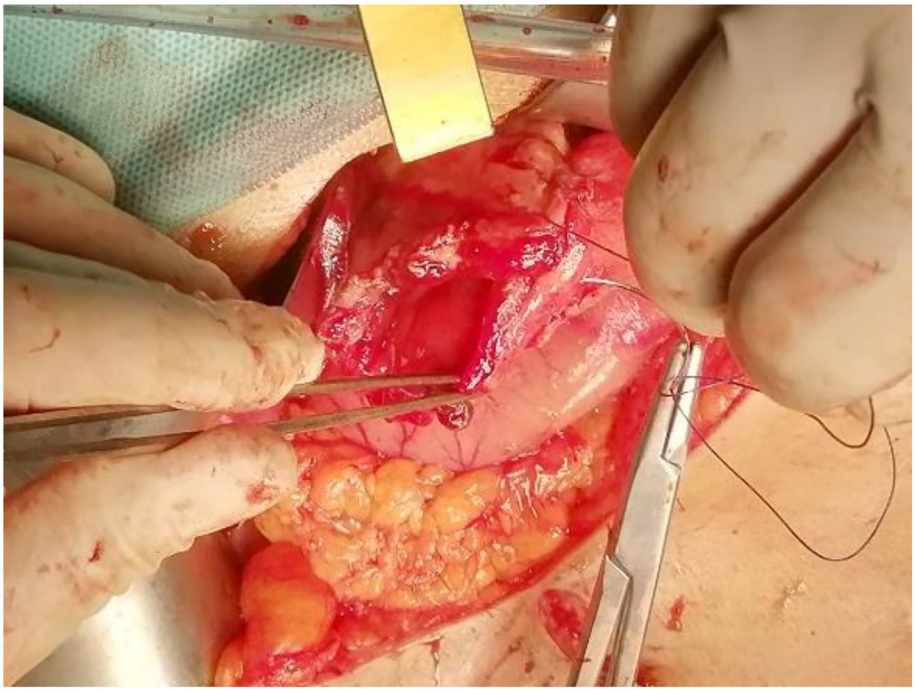

Fig. 2. Ruptured stomach being repaired after reduction.

Thus, we recommend maintaining a high index of suspicion of this unusual diagnosis to find it sooner. Being familiar with its related radiological findings is a must too.

Stomach decompression is therapeutic and should initially be attempted by insertion of a large-bore NG or OG tube +/− suction [4]. Auscultation in the epigastrium and repeat imaging increase the diagnostic yield [5]. Immediate clinical improvement is expected. If not, endoscopic decompression and transthoracic needle decompression (X-ray guided; in a lower intercostal space) [6] can be attempted. Chest tube insertion into the stomach risks disastrous spillage of contents into the pleural cavity [7]. Decompression should be followed by laparotomy, reduction and diaphragm repair.

Besides cardiorespiratory morbidity, gastrothorax can progress to torsion, infarction and rupture [3,8].

In emergency surgery, unlike our case, laparotomy is the access of choice as it allows reduction and inspection of other viscera [1]. However, thoracotomy would guarantee a quicker resolution of the obstructive shock, an easier diaphragmatic repair and the possibility of aortic clamping [6].

Our patient had a severe trauma and multiple associated injuries. Her initial laparotomy (D1) was unfortunately not a formal trauma laparotomy. Furthermore, her later nausea and CXR findings were disregarded as she improved with NG tube. Her case represents a triple diagnostic challenge: the right sided pathology, its unexpected rupture and the necrosis-like aspect of the lung. It is noteworthy that a search on Medline is negative for right gastrothorax.

A review of her initial scans identified a slight L hemidiaphragm thickening on D0 (Fig. 3A) and importantly, an overlooked L paraesophageal fundus herniation on D1 (Fig. 3B). Gastrothorax was first evident on D4's CXR (Fig. 1A), but also on later imaging. In the aftermath, the most likely explanation to the scenario is: traumatic diaphragmatic injury enlarging a potential undocumented hiatal hernia defect, with ensuing stomach herniation, twisting, filling, spontaneous rupture after initiation of liquid diet, and pneumothorax. Intrapleural food debris and pleuritis both contributed to what looked like lung necrosis on CT. *Escherichia coli* culture was another missed, though late, clue to the GI origin of the pleural debris.

The reason behind delayed herniation and right-sided pathology remains unresolved. Finally, noting the L-sided herniation in Fig. 3B, would a left thoracotomy have offered better exposure for diaphragmatic repair?

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Author statement

Richard Ghandour: Corresponding and first author, conceptualization and study design, data acquisition, analysis and interpretation, article drafting and critical revision of the work for important intellectual content.

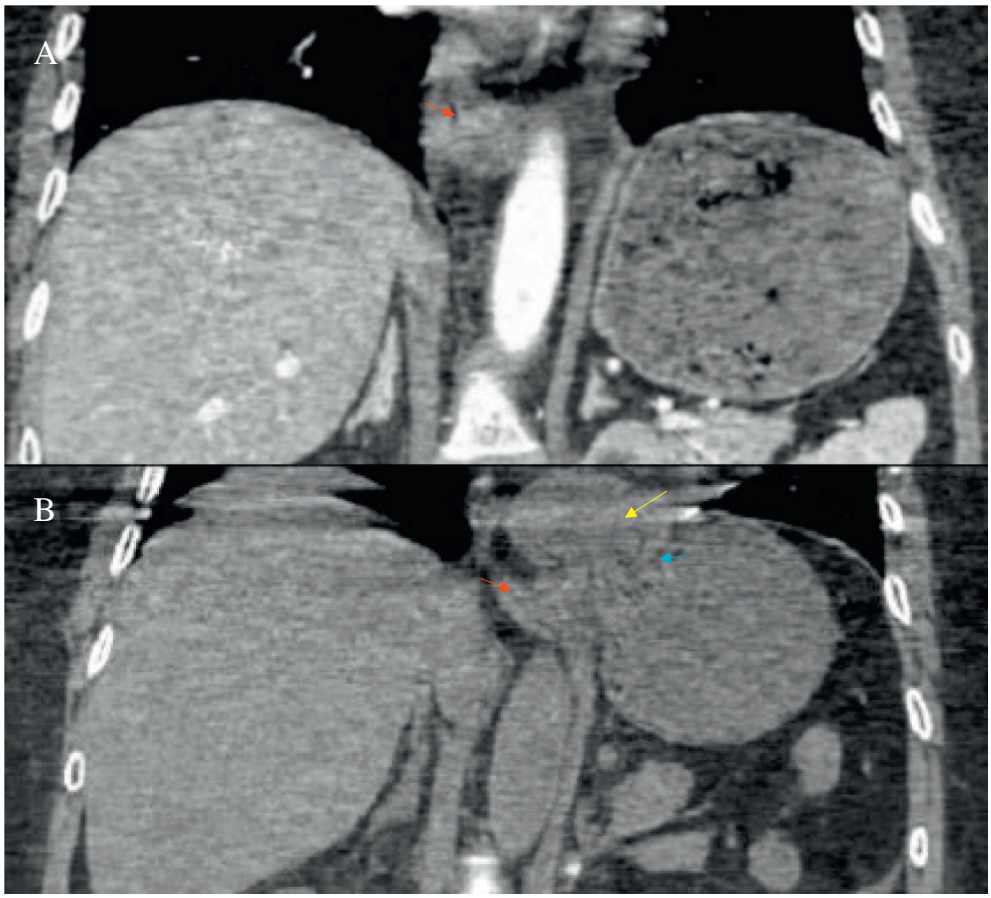

Fig. 3. Coronal views of computed tomography scans. A: D0; B: D1. Right arrow = oesophagus. Yellow arrow = fundus. Blue arrow = collar sign. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

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Fadlo Sayegh: Data analysis and interpretation, critical revision of the work for important intellectual content, and final approval of the manuscript to be published.

Shafica El Masri: Data acquisition, analysis and interpretation, editing and critical revision of the work for important intellectual content, and final approval of the manuscript to be published.

Hadi El Assaad: Data acquisition and arrangement on software, original article drafting, and final approval of the manuscript to be published.

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