

# Colon in the Chest: An Incidental Dextrocardia

## A Case Report Study

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**Abstract:** Diaphragmatic injury is an uncommon traumatic injury (<1%). Although most diaphragmatic injuries can be obvious (eg, herniation of abdominal contents on chest radiograph), some injuries may be subtle and imaging studies can be nondiagnostic in many situations. Patients with diaphragmatic hernia either traumatic or non-traumatic may initially have no symptoms or signs to suggest an injury to the diaphragm.

Here, we report a case of a 75-year-old woman diagnosed with irritable bowel syndrome –associated dominant constipation, presented with shortness of breath, cough, expectoration, tachycardia, and chest pain. Dextrocardia was an incidental finding, diagnosed by electrocardiography, chest radiograph, and CT chest. Parts of the colon, small intestine, and stomach were within the thorax in the left side due to left diaphragmatic hernia of a nontraumatic cause. Acquired incidental dextrocardia was the main problem due to displacement of the heart to contralateral side by the GI (gastrointestinal) viscera (left diaphragmatic hernia).

The patient was prepared for the laparoscopic surgical repair, using a polyethylene mesh 20 cm to close the defect, and the patient recovered with accepted general condition. However, 5 days postoperative, the patient passed away suddenly due to unexplained cardiac arrest.

Intrathoracic herniation of abdominal viscera should be considered in patients presented with sudden chest pain concomitant with a history of increased intra-abdominal pressure.

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**Abbreviations:** ATLS = advanced trauma life support, GI = gastrointestinal, GIT = gastrointestinal tract.

### INTRODUCTION

Dextrocardia is a rare condition that is usually found incidentally and in association with other congenital abnormalities.

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The incidence of dextrocardia has been reported to be less than 1% and a recent study found the incidence to be only 0.22%.<sup>1</sup> Diaphragmatic hernia may lead to acquired dextrocardia. Recognition of the condition enables selecting the proper correctable measures. Patients with diaphragmatic hernia have variant symptoms and signs related to both gastroenterology and cardiology.<sup>2</sup> The abnormalities of diaphragmatic hernia may be life threatening, and usually lead to serious complication. A high index of suspicion needs to be maintained because delayed diagnosis is associated with an increased risk of GI (gastrointestinal) strangulation, which can lead to morbidities and mortalities.<sup>3</sup> Laparoscopy has a sensitivity of 88% and a specificity approaching 100% in the diagnosis of diaphragmatic injury.<sup>4</sup> When identified, injury of the diaphragm is repaired with either open surgical or minimally invasive techniques.<sup>5</sup> The method of choice and the timing of procedure depend on the presence of associated injuries, other medical disorders, and the overall condition of the patient.<sup>6</sup> We present here a case of incidental dextrocardia due to left diaphragmatic hernia where huge parts of the GIT (gastrointestinal tract) were found within the thoracic cavity.

### CASE REPORT

We have experienced a controlled diabetic Egyptian female patient, 75 years old, on insulin therapy, not hypertensive, with history of right knee arthroplasty. She has worked for a long time in an industrial factory; one of her duties was to carry heavy manufactured bags. That patient complained about abrupt abdominal pain, after carrying a heavy bag, 5 years ago. However, she did not seek any medical advice at that time. A year later, she retired and had a continuous complaint of intermittent, progressive attacks of dyspnea, abdominal pain, and constipation. The patient was diagnosed with IBS-dominant constipation. However, family history, past history, conventional abdominal U/S, and other investigations were irrelevant. With time progression, the condition worsened in the form of no passage of stool for successive 3 to 5 days, nausea, repeated vomiting, colicky abdominal pain, moderate form dyspnea, tachycardia, and chest pain. She was referred to specialized center for diagnosis and further management; intestinal obstruction was the primary differential diagnosis. Routine primary investigation revealed left diaphragmatic herniation, with parts of stomach, small and large intestines within the thorax, discontinuity of left diaphragmatic cruses, and the herniated viscera displaced the heart and other mediastinum structures to the contralateral side with shifted trachea to the right side (Figures 1 and 2). Echocardiography revealed dextrocardia with diastolic dysfunction; no masses or thrombi or other abnormalities could be detected.

### METHODS AND EXPLANATION

This case study was carried out in Egypt. The Ethical Committee, Al Azhar Asuit faculty of Medicine, approved the



**FIGURE 1.** Chest x-ray, AP view; heart, rest of mediastinum structures and trachea displaced to contralateral side; dextrocardia.

present study and the patient approved with a written consent prior to the surgery.

This condition must have been initiated at the time of the first abrupt abdominal pain due to sudden increased intra-abdominal pressure as a result of carrying heavy bag (nontraumatic cause); with time, the diaphragmatic defect as a result of previous injury had the tendency to become larger due to straining-related chronic IBS dominant constipation and the chronic cough due to infrequent attacks of bronchitis. Accordingly herniation of abdominal organs becomes more likely, particularly if left sided. The patient was prepared for laparoscopic diaphragmatic repair.

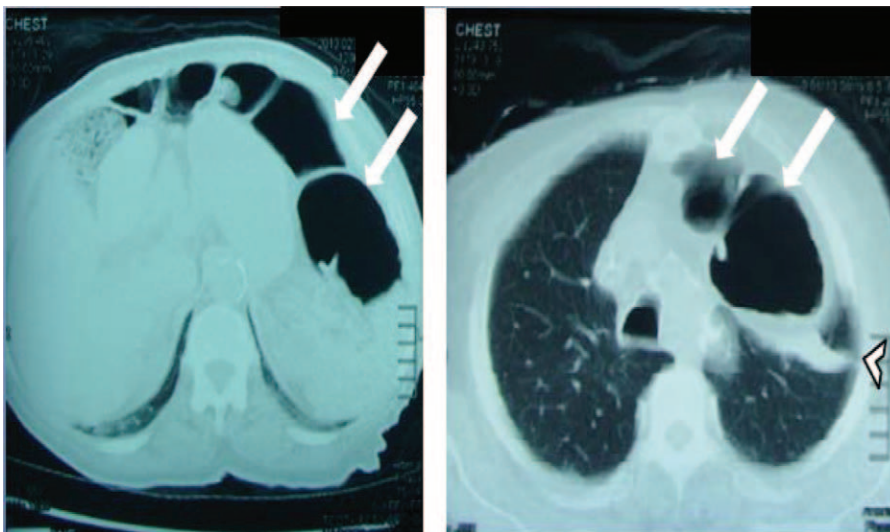
Preoperative assessment included routine investigations with complementary (HBV, HCV) PCR test (*negative*), and estimation of esophageal wall thickness by 2D U/S (*normal thickness*) to exclude viral hepatitis, portal hypertension-related cirrhosis, and bleeding disorders could be endemic in Egypt.<sup>7–11</sup>

At the time of operation, we recognized a diaphragmatic injury: Grade IV, about 15 cm lacerated defect, with part of stomach, small intestine, and big part of the transverse colon herniated through the left diaphragmatic defect. During the laparoscopic surgery, we extracted all herniated viscera, and a 20-cm polyethylene mesh was applied successfully for repair (Figure 3). There was no complications related to laparoscopy or anaesthesia during the operation neither during the first 3 postoperative days. The patient was discharged from ICU on day 3 with good general condition. However, unexplained sudden cardiac arrest happened 5 days postoperation and CPR failed to regain our patient.

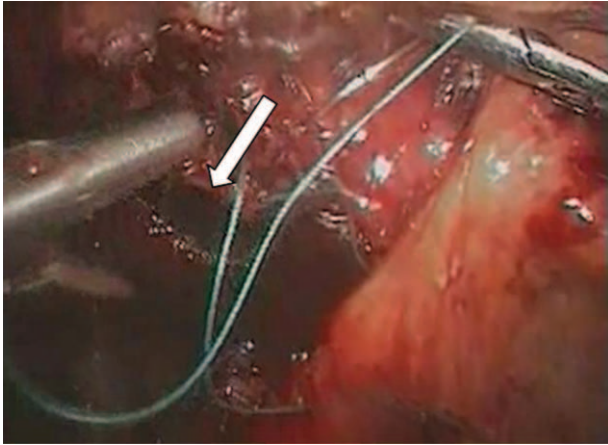
## DISCUSSION

The diaphragm is the musculotendinous boundary between the negative-pressure thoracic cavity ( $-2$  to  $-10$  cm H<sub>2</sub>O) and positive-pressure abdominal cavity ( $+5$  to  $+10$  cm H<sub>2</sub>O). The diaphragm plays a significant role in respiratory mechanics and injury to the diaphragm impairs ventilation and oxygen delivery. The diaphragm can be injured directly due to an impalement or missile passing through it from the abdomen to the thoracic cavity or vice versa, or indirectly from blunt rupture, which is caused by a sudden increase in the intra-abdominal pressure that is sufficient to overcome the strength of the diaphragmatic tissue. Blunt diaphragm rupture usually causes large radial tears of the diaphragm, while penetrating injury leads to smaller rents with the approximate size of the penetrating impalement.<sup>12</sup>

The diaphragmatic injury severity scale is as follows: Grade I: contusion, Grade II: laceration  $\leq 2$  cm, Grade III: laceration 2 to 10 cm<sup>2</sup>, Grade IV: laceration  $> 10$  cm<sup>2</sup>; tissue loss  $\leq 25$  cm<sup>2</sup>, and Grade V: laceration and tissue loss  $> 25$  cm<sup>2</sup>. The initial resuscitation, diagnostic evaluation, and management of the patient with



**FIGURE 2.** CT chest; note the gastrointestinal air (arrow); left diaphragmatic leaflet injury (arrow head).



**FIGURE 3.** Laparoscopic suturing repair: The diaphragm defect (indicated by the arrow).

blunt or penetrating injury is based on protocols from the Advanced Trauma Life Support (ATLS) program, established by the American College of Surgeons Committee on Trauma. The overall morbidity associated with diaphragmatic injury ranges from 30% to 68% and is related to the presence of associated injuries. Patients affected by blunt trauma have higher complication rates (60%) compared with those who have penetrating trauma (40%). Blunt diaphragmatic injuries account for 35% of all diaphragmatic injuries and occur in 0.8% to 1.6% of patients sustaining blunt trauma. Weakness of diaphragmatic cruses especially in old age is one of the most important predisposing factors, additionally; motor vehicle collisions are responsible for up to 90% of blunt diaphragm rupture; and the remainder is caused by falls or crush injuries.<sup>13</sup> The left diaphragmatic leaflet is more likely than the right leaflet to be injured with blunt trauma or increased intra-abdominal pressure; this is explained to be due to a congenital weakness of the left diaphragmatic leaflet. Another explanation may be that the liver protects the right diaphragm by attenuating or preventing the transmission of force across the diaphragm. However, right diaphragmatic herniation may also occur in some situations.

### CONCLUSION

The particular educational message we obtained is to suspect diaphragmatic hernia in a patient presented with non-congenital dextrocardia. Additionally, intrathoracic herniation of abdominal viscera should be considered in patients presented

with blunt abdominal trauma or for those associated with increased intra-abdominal pressure.

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