

# Hydrothorax and air fluid levels in the right chest – a diagnostic dilemma

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## Summary

A diaphragmatic defect that permits abdominal contents to herniate into the right side of the chest is rare. In adults with right-sided diaphragmatic hernias, few occur without a history of trauma, and even fewer are symptomatic. This case report illustrates such a case and the rare entity of an anterolaterally located hernia. Although uncommon and easily missed, consequences of diaphragmatic hernias can be disastrous. The importance of a combination of high clinical suspicion and the use of computed tomography (CT) to aid diagnosis, and the dangers of a surgical condition being incorrectly assessed and admitted to a non-surgical specialty are highlighted in this case.

**Keywords:** right diaphragmatic hernia, adult diaphragmatic hernia, non-traumatic diaphragmatic hernia, congenital diaphragmatic hernia, spontaneous diaphragmatic hernia, strangulated diaphragmatic hernia, obstructed diaphragmatic hernia

## Case report

A 49-year-old female with well-controlled hypertension presented with a two-day history of vomiting, diarrhoea and central abdominal pain with no history of blunt or penetrating trauma. Her vitals were within normal limits, but the glucose level was elevated. She had reduced air entry on the right chest compared to the left with no adventitious breath sounds. Abdominal examination revealed a mildly tender epigastric region. The erect chest radiograph on admission

(Figure 1a) showed air fluid levels and right middle and lower lobe opacification with an associated pleural effusion. She was admitted to the medical ward with the presumptive diagnoses of middle lobe necrotising pneumonia, newly diagnosed diabetes mellitus and acute gastroenteritis. The patient showed clinical improvement on antibiotics.

A repeat chest radiograph 10 days after admission to assess radiographical improvement (Figure 1b) surprisingly showed homogenous opacification of the right lung with

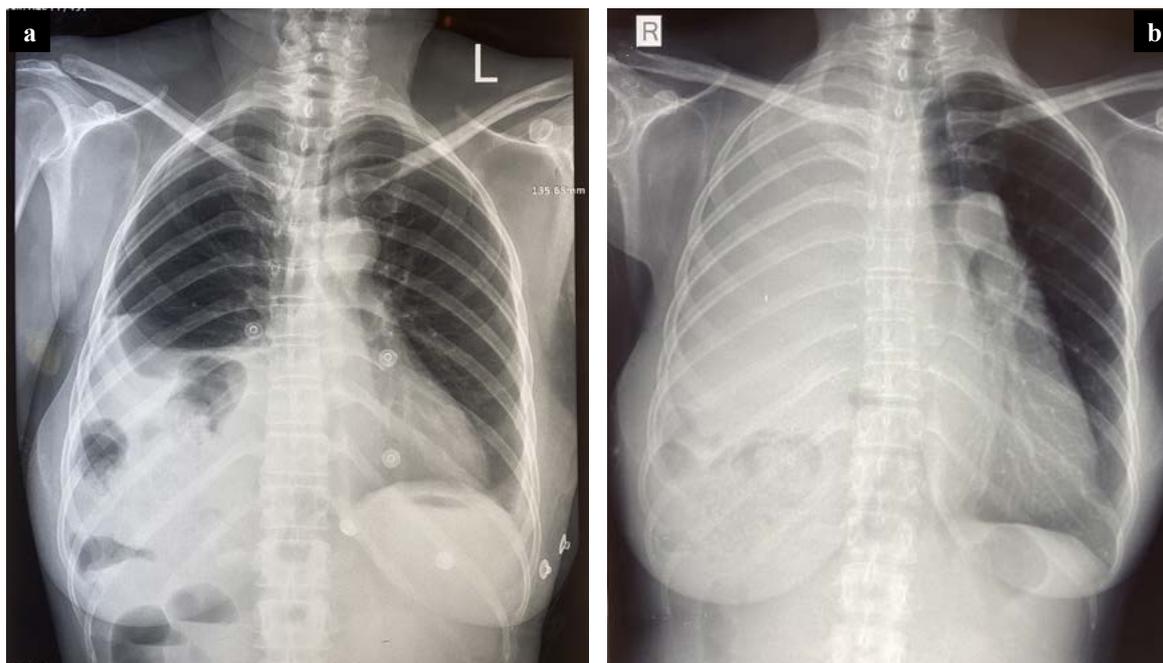


Figure 1: (a) Initial chest X-ray; and (b) repeat chest X-ray 10 days post admission

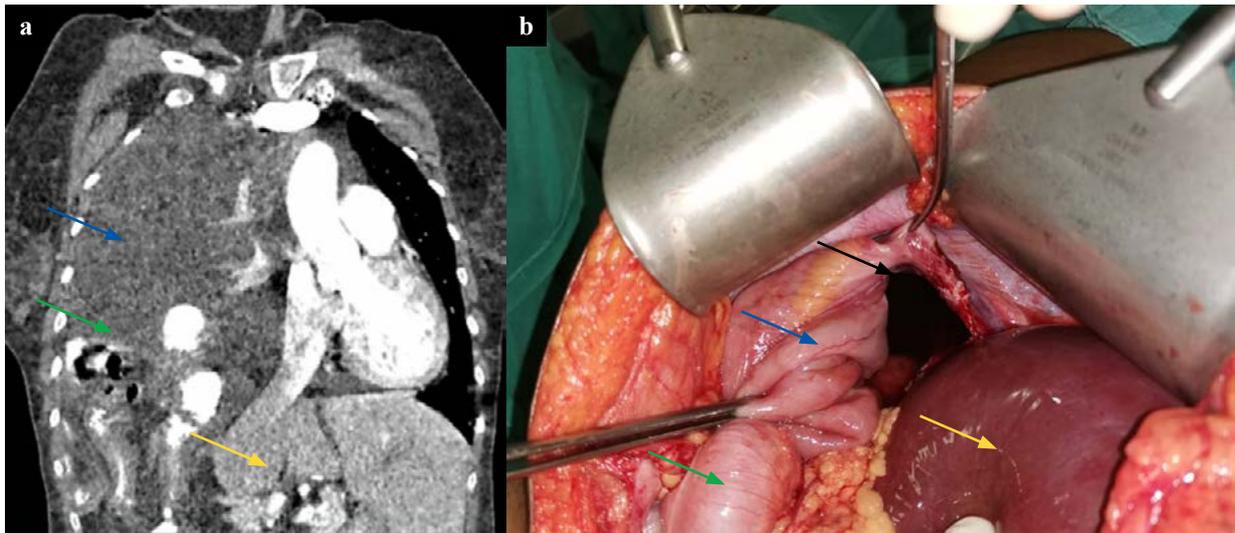


Figure 2: (a) CT image confirming right anterolateral diaphragmatic hernia; right colon (green arrow), ileal loops (blue arrow) and liver (yellow arrow) are illustrated; (b) intraoperative findings including right diaphragmatic defect (black arrow)

marked tracheal and mediastinal deviation to the left. This was assessed as worsening pleural effusion with no associated clinical features of deterioration.

To assist in the further work-up of a diagnostic dilemma, a computed tomography (CT) chest scan was done (Figure 2a) which showed a large (4 x 4 cm) defect noted in the anterolateral right diaphragm with a hernia containing almost the entire right colon as well as ileal loops. There were no features of bowel oedema, obstruction or ischaemia. The liver was occupying the central epigastrium and left hypochondrial regions with the right lobe showing contour deformity from the overlying herniating bowel loops. On reviewing the initial X-ray in retrospect, the features were highly suspicious of a diaphragmatic hernia.

The patient was immediately referred to the surgical department and promptly taken to theatre. An exploratory laparotomy was the chosen method of access due to the familiarity and comfort of the primary surgeon. Intraoperative findings revealed a right diaphragmatic hernia containing the ascending colon, small bowel and caecum including the appendix (Figure 2b). There were extensive adhesions with tight bands on the colon and small bowel. The hernia was reduced from the chest, adhesions were released, and the chest was washed out. A tension-free primary repair was achieved with interrupted polydioxanone sutures without the use of mesh. The caecum was fixed to the right lateral wall. An intercostal drain was inserted into the right chest. The patient had an uncomplicated postoperative course and was discharged after five days. Subsequent follow-up revealed the patient's return to baseline functioning.

## Discussion

Cases of symptomatic right-sided congenital diaphragmatic hernias in adults with no history of trauma are uncommon, although a delayed presentation of a congenital hernia can rarely occur.<sup>1,2</sup> As this patient had no trauma history and no prior imaging, it is assumed that this is a delayed presentation of a congenital hernia or, less likely, a case of a spontaneous rupture. However, an anterolateral defect is not one of the known locations of congenital diaphragmatic hernias. Congenital diaphragmatic hernias are rare congenital anomalies classified according to their position.

Posterolateral (Bochdalek) hernias occur in 78–90% of cases, while anterior retrosternal (Morgagni) hernias occur in 1.5–6% of cases, and trans hiatal hernias occur in 14–24% of patients.<sup>3,4</sup> They are less common on the right due to the earlier embryological closure of the pleuroperitoneal canal on the right as well as the liver acting as a protective mechanism.<sup>1,3</sup> They usually present in childhood, however delayed presentations may occur in affected adults (0.17–6%).<sup>3</sup>

In adults, diaphragmatic hernias are usually asymptomatic, but may present with respiratory or abdominal symptoms in 5–10% of cases. These include chronic dyspnoea, chest pain, abdominal pain, postprandial fullness and vomiting. These symptoms are non-specific, and the condition can be missed if further investigations are not done or incorrectly interpreted, as in this case. Presentations may also be due to life-threatening complications such as obstruction and strangulation.<sup>2,5</sup>

Spontaneous diaphragmatic hernias have rarely been reported in literature. The available evidence shows that they make up 1% of diaphragmatic hernias and are largely left-sided. They are associated with a sudden increase in abdominal pressure in the form of strenuous activity, childbirth, sudden twisting movements and vigorous coughing or vomiting.<sup>6,7</sup> However, the patient had none of these factors reported prior to or during her hospital admission.

The patient presented with mild and non-specific abdominal complaints that resolved before surgical correction of the hernia. Interestingly, the patient had had one previous pregnancy yet had no peripartum symptoms caused by the increased abdominal pressure. The significant radiographic progression noted during her hospital stay was not associated with worsening of her clinical condition. It could be postulated that there was some transient obstruction which caused her initial abdominal symptoms and subsequent radiographic hydrothorax.

The patient was admitted to the medical ward after being assessed as having a medical cause for her radiographic features. The misinterpretation of the X-ray findings resulted in the incorrect management in the medical wards

and potentially exposed the patient to major complications such as obstruction and strangulation.

A definitive diagnosis of a diaphragmatic hernia is made by CT scan which has a sensitivity of 14–82% and a specificity of 87%.<sup>2,5</sup> In resource-limited settings, this modality often has long waiting periods and clinicians depend on X-rays which are seldom reported by radiologists. The CT findings in this patient ultimately assisted the physicians to appropriately refer the patient for intervention. It is evident that the delay had the potential for catastrophic consequences.

This case highlights the diagnostic dilemma associated with atraumatic right diaphragmatic hernias in adults and presents a rare anterolaterally located hernia. The history is vague and symptoms are non-specific. Significant radiographic progression may not produce changes in clinical condition until bowel obstruction and infarction occur which could lead to fatal complications. In state hospitals in South Africa, CT scans are performed for specific indications and are often delayed in stable patients. Interpreting one single clinical feature or radiographic finding in isolation may allow this condition to be easily missed. Of paramount importance to guide the diagnosis of this rare condition is a combination of clinical suspicion and a thorough examination and interpretation of all radiographic modalities.

### ***Conflict of interest***

The authors declare no conflict of interest.

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### ***Ethical approval***

Ethics committee approval was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (Ref: M2211121). Informed patient consent has been obtained.

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