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An unusual cause of an elevated hemidiaphragm.

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Case Report

A 17 year-old non-smoker presented with an intractable dry cough. Previous episodes of cough had been clinically diagnosed as asthma and treated with Budesonide/Fomoterol with partial effect. She had no dyspnoea, chest pain, or fever. She was obese (BMI 33) and had no previous thoraco-abdominal trauma or surgery.

Chest auscultation revealed markedly reduced breath sounds in the right middle and lower zones with bowel sounds heard in the right base. She had left sided expiratory wheeze. A chest x-ray (CXR) displayed a moderately elevated right hemidiaphragm (Figure 1a). Two years previously, a CXR revealed mild elevation of the right hemidiaphragm posteriorly. She had a normal CXR at age 3 years.

She was empirically treated for an acute asthma exacerbation with oral corticosteroids and inhaled bronchodilators. A fluoroscopic sniff test demonstrated paradoxical elevation of the right hemidiaphragm with deep inspiration suggestive of a right phrenic nerve palsy.

After admission, she became more unwell with sinus tachycardia up to 130 bpm, respiratory rate 20 breaths/minute, room air SpO_2 98%, blood pressure 140/85 mmHg and she was afebrile. A computed tomography (CT) scan showed herniation of her intra-abdominal contents, including the

right hepatic lobe, gallbladder, right and transverse colon, into the right hemithorax to the level of T2 consistent with a massive right diaphragmatic hernia (DH) (Figure 1b).

She proceeded to emergency surgery. Her intra-operative course was complicated by severe hypoxia and haemodynamic compromise on induction of general anaesthesia due to impaired venous return as well as right atrial and ventricular compression with tamponade. Laparotomy was performed with decompression of the hernia contents back into the abdomen. The right hemidiaphragm was split at the junction anteromedially between muscular and tendinous portions. The diaphragmatic defect was surgically repaired.

The patient made a complete recovery and her cough subsided. Her post-operative CXR (Figure 1c) and fluoroscopic sniff test were normal.

Discussion

A DH involves the prolapse of abdominal contents into the thoracic cavity due to a congenital or acquired diaphragmatic defect. Congenital DHs almost invariably present in infancy or early childhood and are either posterolateral (Bochdalek) or anterior-retrosternal (Morgagni) (1). Acquired DHs are most commonly traumatic (2), infrequently iatrogenic (3) (resulting from thoraco-abdominal surgery) and rarely spontaneous.

Spontaneous DHs are extremely uncommon (4) but have been reported in the setting of severe coughing or straining (5) and can be life threatening. In this patient, repeated episodes of raised intra-abdominal pressure caused by severe coughing bouts likely contributed to acute on chronic diaphragmatic attenuation and subsequent herniation of the intra-abdominal viscera into her thoracic cavity.

Spontaneous DHs are difficult to diagnose as early symptoms can be absent or non-specific such as dyspnoea, chest or abdominal pain, cough and vomiting (6). Signs of cardiovascular and respiratory compromise only present in the late stage. Similarly, early imaging findings may be unremarkable or subtle.

Conclusion

Spontaneous DHs are exceedingly rare in adolescents and adults. A DH should be considered as a cause of an elevated hemidiaphragm even in the absence of prior thoraco-abdominal trauma or surgery.

Figure 1 (a) Initial CXR demonstrates a markedly raised right hemidiaphragm with a loop of large bowel visible anterior to the liver. (**b)** Contrast-enhanced coronal CT chest performed on day 2 of the patient's admission demonstrates a large right-sided DH. The right lobe of the liver, the gallbladder, porta hepatis and hepatic flexure, ascending colon, caecum, distal ileum and proximal duodenum have herniated into the right hemithorax. There is compression of the right atrium and vena cava. (**c**) CXR performed 2 weeks post diaphragmatic hernia repair show return of the right hemidiaphragm to a normal position, re-expansion of the right lung, and only minor blunting of the right costophrenic angle.

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Abstract:

This case report describes an extremely rare case of an adolescent patient with a history of asthma who presented to the emergency department with a worsening chronic cough and a moderately elevated right hemidiaphragm. She became acutely haemodynamically unstable due to a massive right-sided spontaneous diaphragmatic hernia.

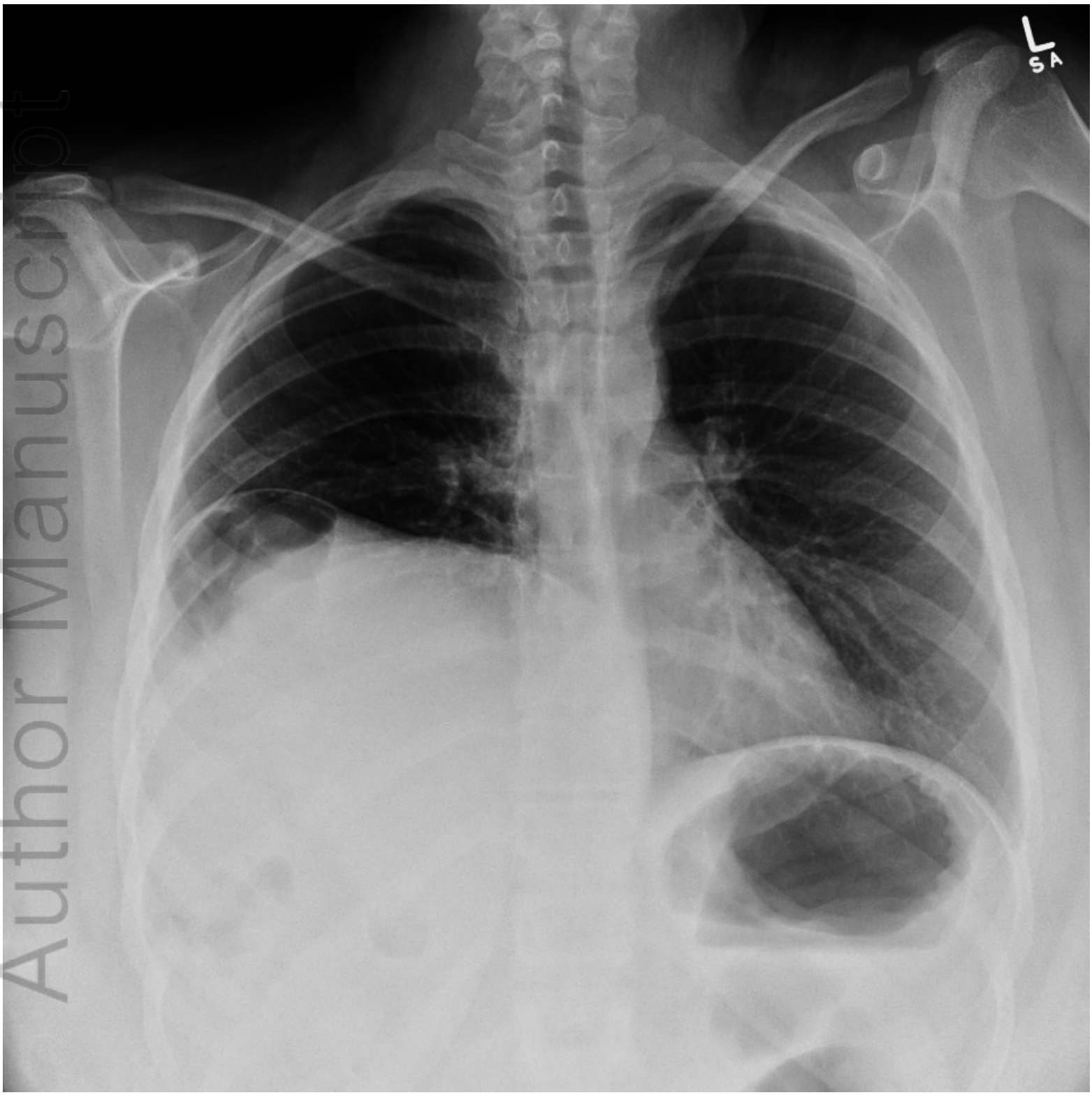

Fig1a_Chest_Preop.jpg

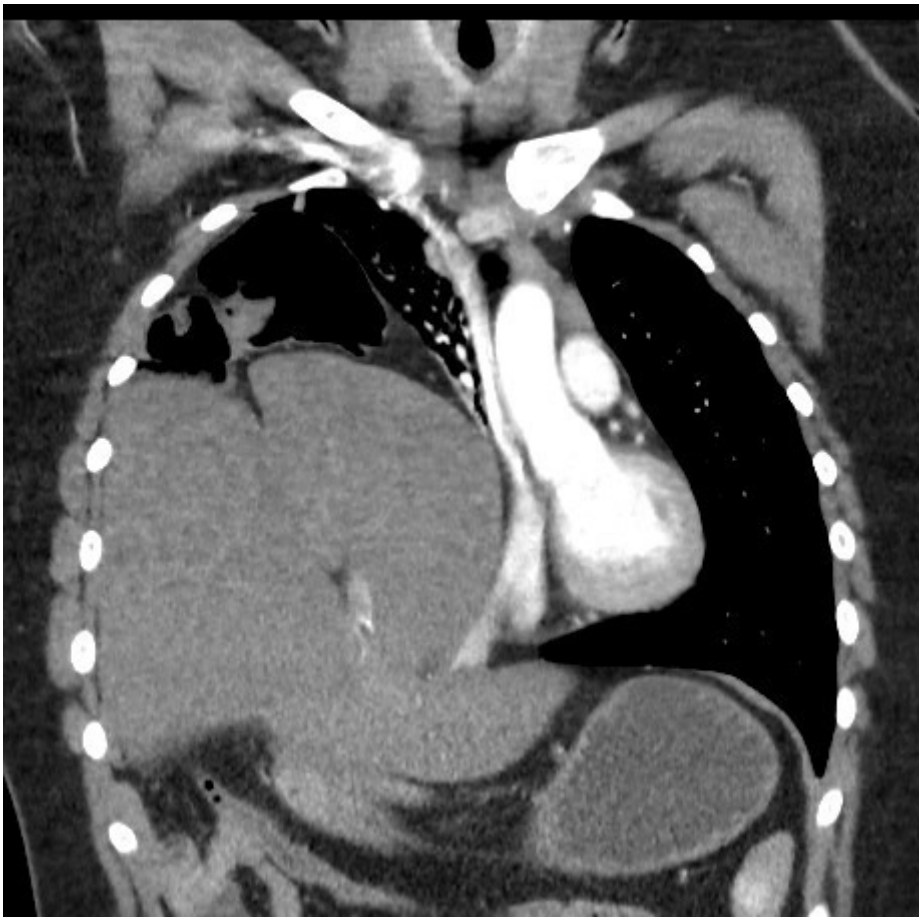

Fig1b_Pre-Op_CoronalCT.jpg

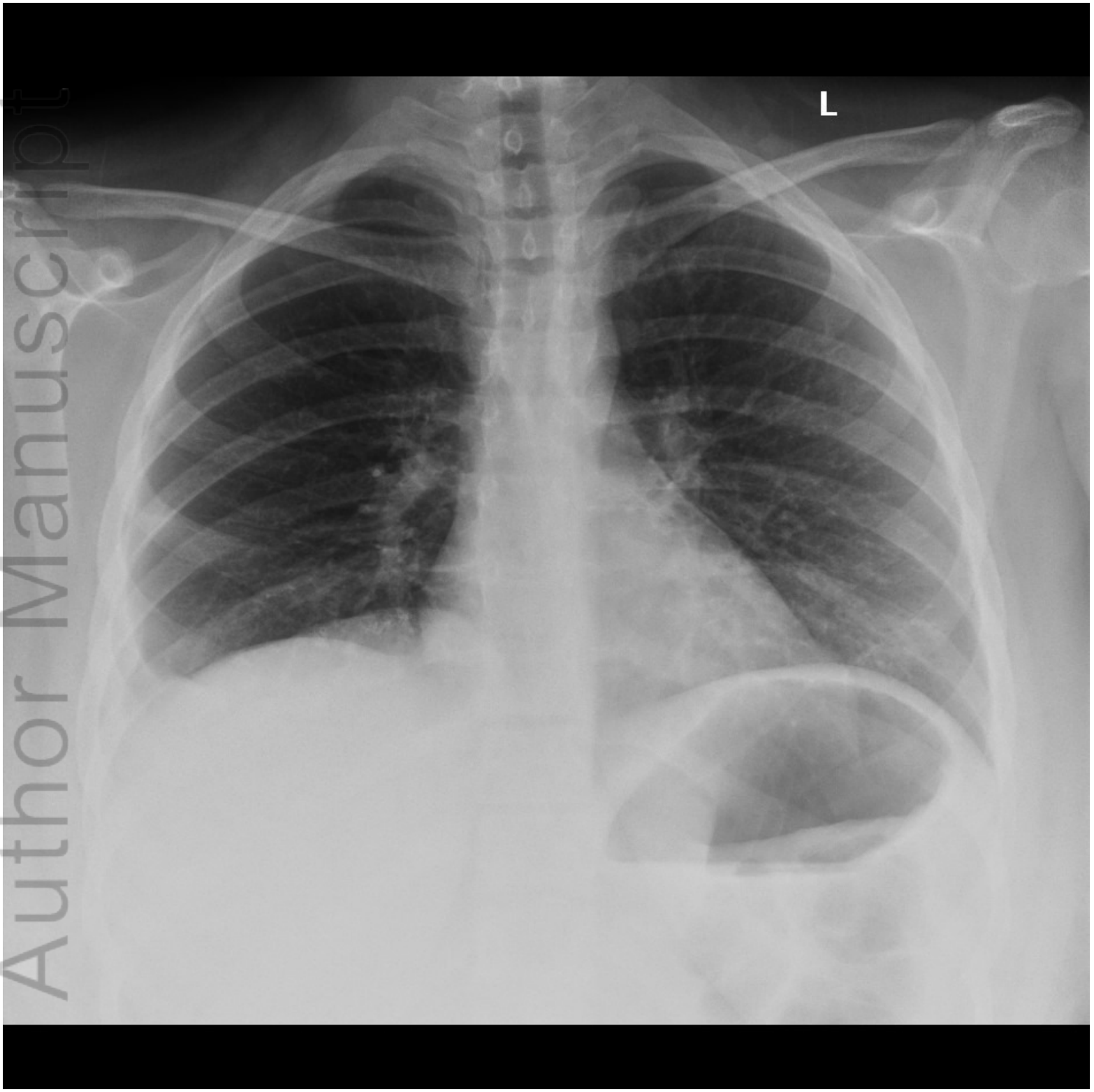

Fig1c_CXR_Postop.jpg

Title

An unusual cause of an elevated hemidiaphragm: Large right-sided spontaneous diaphragmatic hernia induced by severe chronic cough in an adolescent patient with asthma

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Keywords: Elevated hemidiaphragm. Diaphragmatic hernia, Tamponade, Cough, Adolescent