

A rare cause of shortness of breath: relaxatio diaphragmatica

Antonio Mirijello^{1,2} · Cristina d'Angelo^{1,3} · Salvatore De Cosmo² · Giovanni Addolorato¹ · Raffaele Landolfi¹

Received: 6 May 2015 / Accepted: 14 May 2015 / Published online: 28 May 2015
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A 36-year-old man with no relevant past medical history was referred to our Internal Medicine outpatients Unit because of shortness of breath gradually occurred during the last 12 months. He was working as a security agent and was experiencing this symptomatology during sports activities, in particular during scuba diving. Notably, the patient had gained about 8 kilos in the prior year.

The patient's general appearance was good: he was eupnoeic and comfortable with no respiratory distress while resting. Blood pressure was 118/72 mmHg, pulse rate was 58 beats/min, respiratory rate was 13 breaths/min with an oxygen saturation of 98 %. At physical examination, a reduced murmur at the left lower lung field was found. A chest X-ray study showed a marked elevation of the left hemi-diaphragm, and a significant right shift of the mediastinum, with no signs of pneumothorax or pleural effusion (Fig. 1a). An US scan showed the absence of diaphragmatic thickening during inspiration. A chest MRI (Fig. 1b, c) confirmed the marked elevation of the left hemi-diaphragm up to a plane passing through the carina. The diaphragmatic dome was normal without signs of

diaphragmatic rupture. The midline was significantly shifted to the right. The spleen, small bowel, transverse colon, pancreatic tail and left lobe of the liver were in the thorax with an “upside down” stomach.

Relaxatio diaphragmatica, also called diaphragmatic elevation, is an anomalous position of the diaphragmatic dome in the chest and represents a rare case of exertional dyspnoea [1]. It can be a congenital or acquired condition; this lasts mostly due to phrenic nerve palsy or post-traumatic rupture of the diaphragm.

The diagnostic workup requires a complete medical history and diagnostic tests [2, 3]. A pleural effusion can be excluded by chest X-ray study or US scan. Diaphragmatic motility can be assessed by chest radiograms (comparing inspiratory vs. expiratory images) or by US scan (evaluating diaphragmatic excursion and thickening during inspiration). A chest CT scan may be useful to exclude mediastinal masses. Finally chest MRI represents an emerging and promising diagnostic examination to evaluate diaphragmatic morphology, and to exclude diaphragmatic rupture.

In his past medical history, the patient had been involved 15 years before, in a motorcycle accident, which caused a fracture of the left clavicle, and possibly a post-traumatic phrenic nerve palsy. It is conceivable that the weight gain and the consequent increase in abdominal pressure worsened the elevation of the hemi-diaphragm with a reduction of lung capacity. The patient was eupnoeic at rest and during his normal activities because his gas exchanges and other inspiratory muscles were normal. However, conditions producing an increase of oxygen demand (i.e., sports activities) or an increase in abdominal pressure (i.e., scuba diving), caused “shortness of breath.”

Weight loss was prescribed and 1 year later dyspnoea had been markedly reduced.

✉ Antonio Mirijello
antonio.mirijello@gmail.com

¹ Department of Medical Sciences, A. Gemelli Hospital, Catholic University of Rome, Rome, Italy

² Department of Medical Sciences, IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo, Foggia, Italy

³ “Gli Angeli di Padre Pio”, Padre Pio Rehabilitation Centres Foundation ONLUS, San Giovanni Rotondo, Foggia, Italy

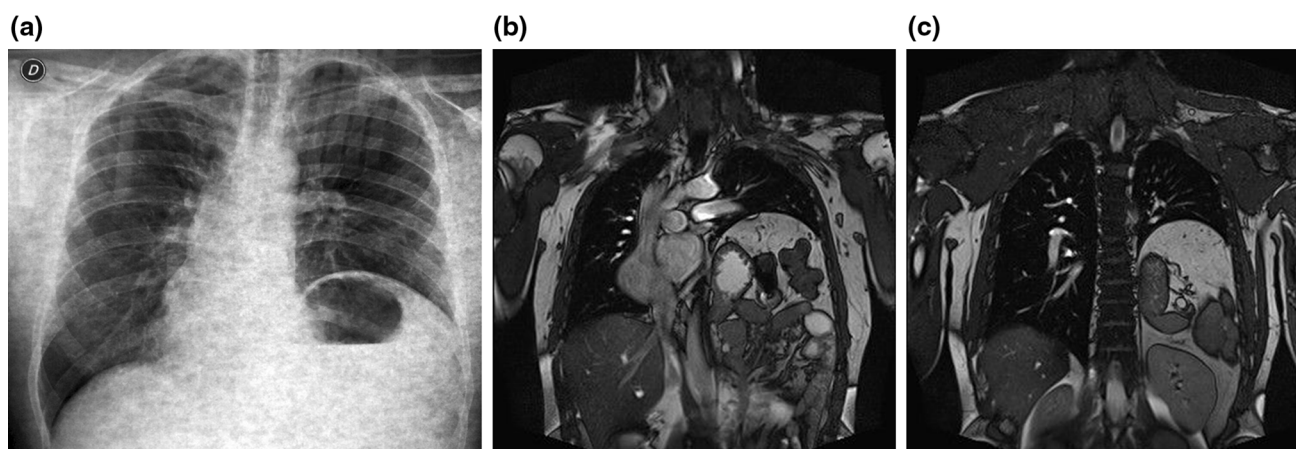


Fig. 1 **a** Chest X-ray showing a significant elevation of the left hemidiaphragm with gastric distension, and right shift of the cardio-mediastinum. No significant alterations of lung parenchyma. **b, c** Chest MRI, coronal section, showing an elevation of the left hemidiaphragm up to a plane passing through the carina. The

diaphragmatic dome is normal without signs of rupture. The midline is significantly shifted to the right. The spleen, small bowel, transverse colon, pancreatic tail and left lobe of the liver are shifted in the thorax with an “upside down” stomach

Acknowledgments We thank Ms. Caterina Mirijello for the revision of the English language.

Conflict of interest None.

Statement of human and animal rights The authors hereby declare that the research documented in the present manuscript, involving human participant, has been carried out in accordance with the ethical standards of the institutional and national research committee and have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendment or comparable ethical standards.

Informed consent Written informed consent was obtained from the patient.

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