

Clinical Quiz

*Mohammed A. Yassin, MD.
Specialist, Department of Medicine,
Hamad General Hospital, PO Box 3050, Doha, Qatar.
Tel. +974 4879228. Fax. +974 4392273. E-mail: yassin160@yahoo.co.uk*

Notice: Authors are encouraged to submit quizzes for possible publication in the Journal. These may be in any specialty, and should approximately follow the format used here (maximum of 2 figures). Please address any submissions to: Editor, Saudi Medical Journal, Armed Forces Hospital, PO Box 7897, Riyadh 11159, Kingdom of Saudi Arabia. Tel. +966 (1) 4777714 Ext. 6570. Fax. +966 (1) 4761810 or 4777194.

An elderly man with shortness of breath and abnormal chest x-ray

Clinical Presentation

A 73-year-old male presented with shortness of breath for 2 weeks, mainly on exertion. His chest x-ray is shown in **Figure 1**.



Figure 1 -

Questions

1. Describe the abnormalities.
2. What is your diagnosis?
3. Mention 3 conditions, which can lead to such problem.

Clinical Quiz

Answers

1. There is an elevation of the left hemidiaphragm, and what looks like air under the diaphragm is the stomach.
2. Unilateral diaphragmatic paralysis.
3. Phrenic nerve injury due to stretching or cooling during cardiac surgery is a common etiology. Herpes zoster, cervical spondylosis, poliomyelitis; compressive tumors, pneumonia, and iatrogenic embolization are infrequent causes of unilateral paralysis.

Discussion

Diaphragmatic paralysis can involve either the whole diaphragm (bilateral), or only one leaflet (unilateral).¹⁻³ In this setting, the accessory muscles of respiration assume some or all the work of breathing, depending upon the degree of diaphragmatic compromise. This is achieved by a more intense contraction of the accessory muscles and by the progressive recruitment of other, less important accessory inspiratory muscles (sternomastoid, trapezius, latissimus dorsi, and pectoralis minor and major). Patients may also recruit abdominal muscles during exhalation as the disease progresses. If, in bilateral diaphragmatic paralysis, there is underlying lung disease or if the accessory muscles are also afflicted by the disorder affecting the diaphragm, the increase in load may tire the already weakened accessory muscles. This can directly cause ventilatory failure, which can be worsened by chronic hypoxemia. Once diaphragmatic paralysis is suspected clinically, a chest radiograph should be obtained. Important additional studies include pulmonary function testing and electromyography (EMG). Unilateral diaphragmatic paralysis is more common than bilateral disease, and causes include motor neuron disease, myopathies, certain forms of muscular dystrophy particularly limb-girdle muscular dystrophy, acid maltase deficiency, systemic lupus erythematosus, hypothyroidism, and hyperthyroidism. Phrenic nerve injury, herpes zoster, cervical spondylosis, poliomyelitis, compressive tumors, pneumonia, and iatrogenic embolization are infrequent causes of unilateral paralysis. Patients with unilateral diaphragmatic paralysis who do not have underlying lung disease are usually asymptomatic at rest, but may have dyspnea and decreased exercise performance with exertion.

Diagnosis can usually be made with radiographic studies alone. A frontal chest radiograph with an elevated hemidiaphragm is sensitive, but not specific, for the diagnosis of unilateral diaphragmatic paralysis.⁴ *Pulmonary function:* the vital capacity (VC), shows decreased values that ranges from 70 - 80% of those predicted, a less pronounced reduction than seen with bilateral disease. The VC may decrease by 15 - 25% in the supine position, occasionally leading to a reduction in oxygen saturation. The deleterious effect of the supine position is more pronounced with paralysis of the right hemidiaphragm due to the weight of the liver. *EMG and physiologic testing:* the EMG has a limited role in unilateral diaphragmatic paralysis, which usually carries an excellent prognosis unless caused by an inherently fatal illness. Surgical plication of the affected hemidiaphragm will improve both physiology and clinical manifestations in patients with significant symptoms.

References

1. Davis J, Goldman M, Loh L, Casson M. Diaphragm function and alveolar hypoventilation. *QJ Med* 1976; 45: 87-100.
2. Gibson GJ. Diaphragmatic paresis: pathophysiology, clinical features, and investigation. *Thorax* 1989; 44: 960-970.
3. Laroche CM, Carroll N, Moxham J, Green M. Clinical significance of severe isolated diaphragm weakness. *Am Rev Respir Dis* 1988; 138: 862-866.
4. Chetta A, Rehman AK, Moxham J, Carr DH, Polkey MI. Chest radiography cannot predict diaphragm function. *Respir Med* 2005; 99: 39-44.