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CE - MEDICAL ILLUSTRATION

Diaphragmatic paralysis following blunt neck trauma

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A 25-year-old construction worker presented to the emergency department (ED) after the accidental fall of a metal bar on his neck. In the field, he was appropriately managed with a cervical collar for possible spine injury. On arrival at the ED, he was fully conscious with severe neck pain, hypotensive 80/50 mmHg and bradycardiac 48 beats/min. Physical examination revealed a flaccid paralysis and sensory loss in all four extremities. A chest X-ray study was unremarkable (Fig. 1, panel a). Two hours later, after examination revealed absent air entry over the right lung base, a repeat X-ray study showed an elevated right hemidiaphragm and an ipsilateral mediastinal shift (Fig. 1 panel b). Computed tomography (CT scan) of the neck showed a comminuted, posteriorly displaced fracture of the third cervical vertebrae (Fig. 1, panel c and d). In view of the established quadriplegia and neurogenic shock, this X-ray finding is suggestive of unilateral diaphragmatic paralysis. The delayed onset of diaphragmatic paralysis probably coincides with the evolving post-traumatic spinal cord edema. A few hours later, he developed respiratory distress with evident abdominal wall retraction during inspiration and protrusion during expiration in addition to hypoxia, hypercapnia and respiratory acidosis on blood gas analysis. The trachea was intubated and mechanical ventilation was started. This worsening respiratory status was concerning for the progression into bilateral diaphragmatic paralysis. Throughout the ICU course, his neurological status failed to improve requiring continued mechanical ventilation and subsequent tracheostomy. He was transferred to a subacute rehabilitation facility for further care.

The diagnosis of diaphragmatic paralysis is suggested clinically by the presence of abdominal wall retraction during inspiration and protrusion during expiration. Whereas unilateral diaphragmatic paralysis is usually well tolerated in the absence of underlying lung pathology, bilateral paralysis requires long-term ventilatory support. In contrast to bilateral diaphragmatic paralysis, a chest X-ray study is more specific for diagnosing a unilateral paralysis. Fluoroscopy confirms the diagnosis when paradoxical inspiratory elevation of the paralyzed hemidiaphragm is evident.

Conflict of interest None.

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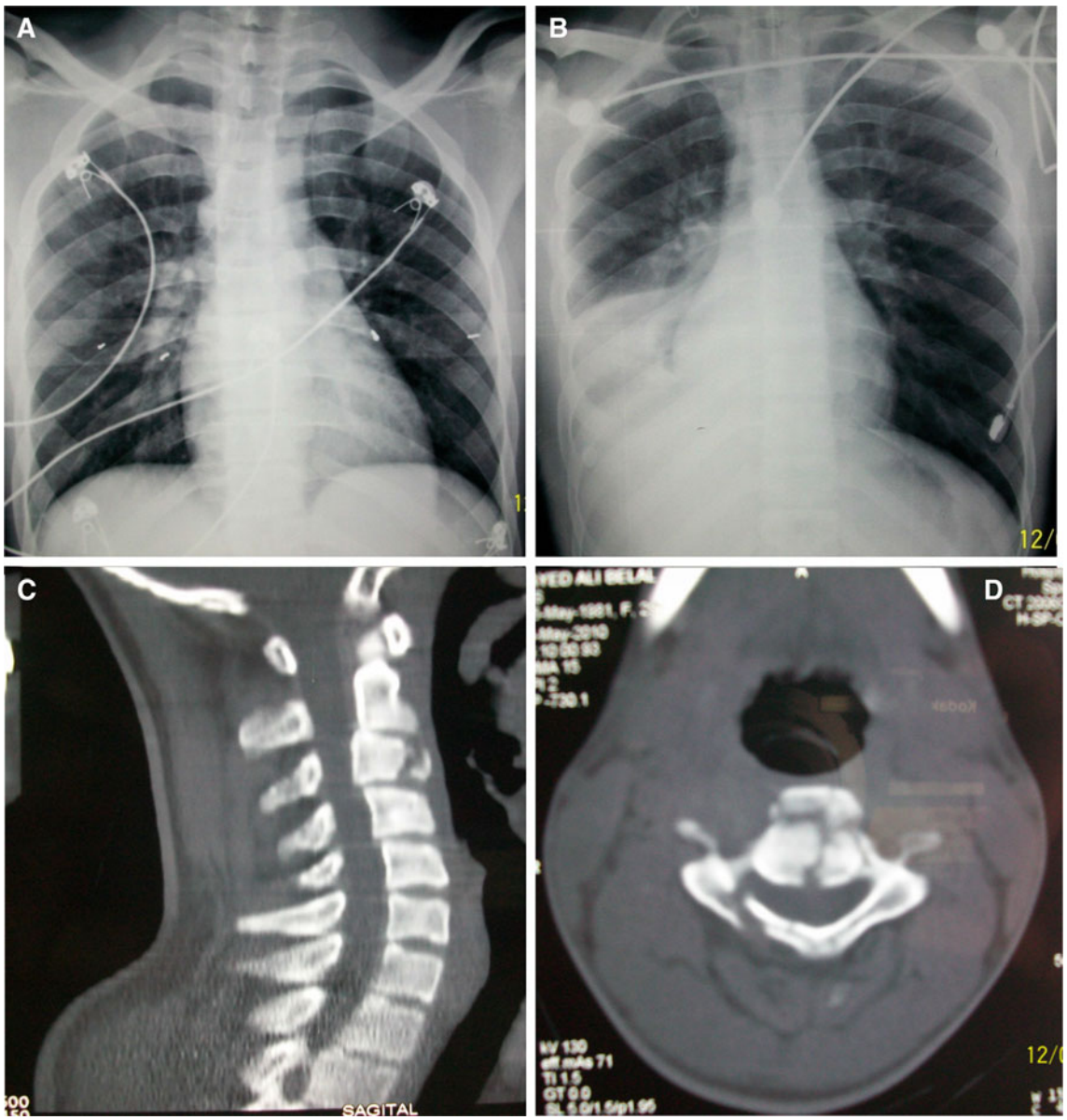

Fig. 1 **a** Normal chest X-ray. **b** chest X-ray performed 2 h later revealing significant elevation of the right hemidiaphragm up to the right infrahilar region with ipsilateral cardiomediastinal shift. CT scan of the neck in the sagittal (**c**) and axial (**d**) plane showing an acute comminuted fracture of C3 vertebral body with slight posterior displacement of the major posterior fragment into the spinal canal causing probable mass effect upon the traversing spinal cord