

# Evidence Discussion (CH 30.1)

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## Elevated Hemidiaphragm

Diaphragmatic dysfunction includes eventration, weakness and paralysis. Diagnosis is based in part on static and dynamic imaging tests.(1) Unilateral diaphragmatic paralysis is often asymptomatic and suspected when an elevated hemidiaphragm is found incidentally on chest x-ray (CR). CR is a simple and effective test to evaluate the pulmonary parenchyma and the diaphragm.(1) The positive and negative predictive value of an elevated hemidiaphragm on CXR for diaphragmatic dysfunction is 33% and 93%, respectively. The presence of diaphragm elevation is not necessarily a sign of dysfunction, but its absence makes it unlikely.(1)

Fluoroscopy has traditionally been the gold standard for diagnosing diaphragmatic paralysis since it can visualize the diaphragm throughout the respiratory cycle and during forced inspiratory maneuvers (ie the “sniff test”). Some authors now consider US to be the imaging method of choice for the evaluation of diaphragmatic dysfunction.(1,2) US is non-invasive, portable, quick and does not expose the patient to ionizing radiation. Absence of thickening of the diaphragm during inspiration, absence of caudal movement during normal inspiration or paradoxical movement during the sniff maneuver confirms paralysis.

A common concern is whether there is an underlying serious condition in those patients with unilateral hemidiaphragm paralysis with no evident etiology after a history, physical exam and CR. Piehler et al concluded that such patients are unlikely to have an underlying occult malignant or neurologic condition.(3) However, Windisch et al recommended that a one-time CT chest be done if there is clinical suspicion of possible malignancy with damage to the phrenic nerve.(2)

Additional imaging may be needed to rule out conditions which can cause an elevated hemidiaphragm but are not associated with respiratory muscle weakness. For example, abdominal imaging can be done for suspected hepatic abscess, ascites, or splenomegaly.

1. Ricoy J, Rodriguez-Nunez N, Alvarez-Dobano JM, et al. Diaphragmatic dysfunction. *Pulmonol*. 2019; 25 (4): 223-235.
2. Windisch W, Schonhofer B, Magnet FS, et al. Diagnosis and Treatment of Diaphragmatic Dysfunction. *Pneumologie*. 2016 Jul; 70(7): 454-61.
3. Piehler JM, Pairolero PC, Gracey DR, Bernatz PE. Unexplained diaphragmatic paralysis: a harbinger of malignant disease? *J Thorac Cardiovasc Surg*. 1982 Dec;84(6):861-4.