DIAPHRAGMATIC PARALYSIS: A PRESENTATION OF SPONTANEOUS ATYPICAL CHEST PAIN AND SHORTNESS OF BREATH

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Introduction

Chest pain accounts for approximately 7.6 million annual visits to emergency departments (ED) in the United States and can include a broad differential [1]. The workup warranted includes extensive testing with the goal of demonstrating a reassuring cardiopulmonary status. When preliminary chest pain workup is negative, the subtle features of common primary symptoms can provide insight into other less common etiologies. This case looks to highlight the rare presentation of a relatively healthy middle age male with complaint of chest pain and shortness of breath, worsened with exertion and supine position. When standard cardiopulmonary workup was negative, further specialty testing was pivotal to identify a rare and potentially life threatening cause to his symptoms in the form of diaphragmatic paralysis. Frequently asymptomatic, presenting symptoms can vary in severity from common dyspnea, shortness of breath, and orthopnea to acute respiratory failure. Consideration of rare causes, such as diaphragmatic paralysis, is important to ensure accurate evaluation and identification of this physiologic defect.

Case Study

56 year old Caucasian male with past medical history of gout presented from urgent care to the emergency room with report of three weeks of intermittent shortness of breath and new onset chest pain. The patient reported abruptly waking up that morning gasping for air. For the remainder of the day he had a sensation of chest pain and tightness with increasing lightheadedness prompting ED evaluation. On examination, the patient's vitals were stable and cardiopulmonary exam was reassuring. Workup included labwork, EKG, and imaging. Troponin was negative; however, DDimer was elevated. EKG demonstrated left ventricular hypertrophy without signs of ischemia. Chest XR showed low lung volumes with bibasilar atelectasis. CT angiogram of the chest with and without contrast showed no evidence of pulmonary embolus; however, it did demonstrate mild eventration of the left hemidiaphragm. Patient was discharged with close outpatient follow up with cardiology.

Within the week patient was seen by cardiology where he reported persistent shortness of breath and chest pressure. Both symptoms reportedly worsened when supine. On further interview patient also endorsed dyspnea on exertion ongoing for one year. Dobutamine stress echocardiogram identified posteriobasal segment ischemia and EF 55-60%. Testing was terminated due to provocation of chest pain and shortness of breath. Cardiology proceeded with cardiac catheterization which was negative for coronary obstruction and demonstrated mild to moderate atherosclerotic disease. Patient had no stenting and was started on Clopidogrel.

Case Study

Patient returned to cardiology about one month after initial ED visit reporting continued shortness of breath. With negative cardiac catheterization, focus was transitioned to other cardiopulmonary etiologies. Pulmonary function test demonstrated mild hyperinflation and borderline reduction of vital capacity with normal total lung capacity. Home polysomnogram was positive for mild obstructive sleep apnea and chronic obstructive pulmonary disease and the patient was started on Budesonide/Formoterol inhaler and CPAP.

Patient visited ED again two months after initial ED visit where findings again included positive DDimer and negative EKG, troponin, chest xray and CT angiogram of chest for pulmonary embolism. Patient established with primary care the following week with report of persistent continued chest tightness and shortness of breath unchanged by inhaler. Patient was referred to pulmonology for evaluation and treatment.

Pulmonology determined worsening symptoms when supine in the context of his extensive workup was concerning for potential diaphragmatic dysfunction. Patient completed sniff testing which confirmed left hemidiaphragm paralysis. Patient was referred to cardiothoracic surgery where he completed left thoracotomy with left diaphragmatic plication. On further questioning patient admitted to fall with anterior chest wall trauma ten years ago that resulted in chest pain. He admitted that over the years his chest pain was accompanied by shortness of breath, however, both symptoms had acutely increased over the past few months. Ultimately, patient completed surgical plication of the left hemidiaphragm just shy of three months from initial presentation.

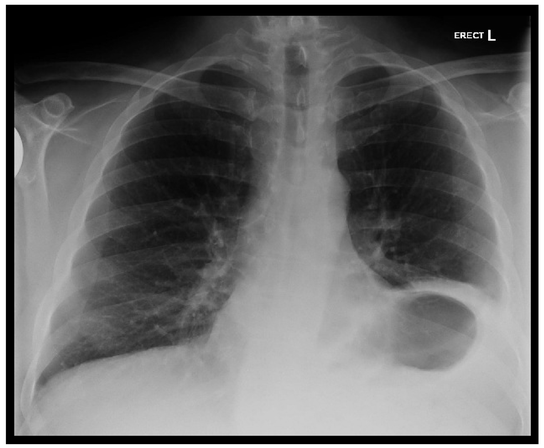

Fig 1. View of diaphragmatic paralysis on CT

Discussion and Conclusion

Diaphragmatic paralysis is associated with various etiologies including traumatic, idiopathic, infectious, and neurovascular with injury to the phrenic nerve during cardiothoracic surgeries being the most common[2,3]. Depending on the underlying cause and lateralization, pulmonary symptoms can range from asymptomatic to respiratory failure. Other symptoms seen in literature include chest pain, fatigue, insomnia, heartburn, and even headache[4,5]. In our patient, among the many symptoms he endorsed, the provocation of his dyspnea when moved into a supine position was a feature that could have directed us to diaphragmatic palsy[6]. When supine, the decrease in maximum diaphragm muscle power causes reduced lung function and thus sharp increase in symptoms[3]. This can be identified on spirometry however the standard for diagnosis is via sniff testing[6]. Whether under ultrasound or fluoroscopy diaphragmatic movements can be directly visualized and exaggerated when patient sniffs on command. Positive findings would be no movements or paradoxical movements of the diaphragm in the opposite direction[3,7].

This case aims to illustrate how the common complaint of chest pain and shortness of breath can be a symptom of a rare condition like diaphragmatic paralysis. In this case, the suspected underlying cause of his presentation was later found to be traumatic although the acute worsening of symptoms remains unclear. As clinicians, insight into symptom variability with appropriate examination can yield timely diagnosis and appropriate lifesaving treatment as indicated.

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Acknowledgements

Thank you to my clinic attendings, Dr Lois and Dr Wise, LGHM radiology, and my residency program at Lewis Gale Hospital Montgomery for their help and support with this case.