Study of diaphragm in chronic obstructive pulmonary disease using ultrasonography

Sir,

In response to the letter submitted by Hadda *et al.*,[1] we would like to respond that some information was inadvertently not published.

Some information in the methods was inadvertently not published. The exclusion criteria for the study included patients with lower respiratory tract infection or acute exacerbation, those with hemodynamic stability and acute cardiac events such as acute cor pulmonale or myocardial infarction, or those unable to hold their breath.

All ultrasounds of diaphragm were done by the same radiologist trained in ultrasonography. Movements of the diaphragm were assessed using B mode high-resolution probe. Sonographic images were captured at both end expiratory and maximum inspiration. The probe was placed against the chest wall anterior to the right midaxillary line. On the right side, the diaphragm lies between the lower rib cage and the liver. It is the ideal area to visualize the diaphragm. The zone of apposition was determined by the radiologist using a high-resolution probe of 7–10 MHz. The distance between the costal origin of the diaphragm and the point where the diaphragm peeled away from the chest wall was taken as the measurement of length of zone of apposition, whereas the costal origin of the diaphragm was determined by change in angle and thickening of diaphragmatic muscle layer caudal to diaphragmatic origin.[2-5] The results were rechecked by the same radiologist. Further, we did not have any Gold Grade D patients.

The increased movement and increased zone of apposition in severe chronic obstructive pulmonary disease (COPD) as we have concluded could be explained by the fact that these patients were undergoing pulmonary rehabilitation with diaphragm exercises. Some patients were obese; we conjectured that this increased intra-abdominal pressure could be pushing the diaphragm up in these patients. However, as we concluded and as we all know, we would have thought that diaphragmatic movements decrease with increasing COPD severity, but at least in our selected group of patients, it seems to be otherwise in severe COPD. There are many factors in COPD which we find difficult to correlate such as severity of breathlessness and correlation with pulmonary function test. Similarly, whether any diaphragmatic changes are occurring that we are unaware of would be unraveled by further studies of similar nature. Finally, we have suggestion of further muscle biopsy and Electromyography studies.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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