Detection and characterization of Cardio-Pulmonary Patho-Physiological States and diseases by Transthoracic Parametric Doppler (TPD)

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Abstract

To explore the performance of the TPD system in detection of COPD, based on spirometry tests and overall physician evaluation. Lung Doppler signals (LDS) were recorded transthoracically over the chest wall by the pulsed Doppler ultrasound system developed by EchoSense (Haifa, Israel). These signals, recorded from the pulmonary vascular bed, result from the radial movement of blood vessels walls in synchrony with blood flow/pressure pulsation. The LDS that are affected by the various lung tissue components, were recorded from three locations on the right chest wall: upper, mid and lower for about three min, without any need for patient cooperation. The study was designed to evaluate the potential of the LDS to diagnose COPD in comparison to spirometry measurements- the current gold standard method. 120 COPD patients were enrolled in an outpatient clinic together with 100 non-COPD patients. All patients underwent full pulmonary function tests, physical exam, medical history and demographics. In addition, 114 control subjects, who had normal spirometry, were recorded in a community clinic. Deep learning methods were utilized to derive an algorithm designed to differentiate between the two groups.

Results

- The performance of the diagnosis COPD patients in comparison to Healthy patients was sensitivity/specificity 89%/89%.

- The performance of the diagnosis by means of the LDS, was Sensitivity/specificity 81%/81%.

Biography

Bushra Mina is Director of the Pulmonary Critical Care Fellowship Program, and Section Chief for Pulmonary Medicine at Lenox Hill Hospital. He is an Assistant Clinical Professor at Zucker Scholl of Medicine at Hosfstra. He is a key faculty member in the department of Internal Medicine and Vascular Surgery Fellowship Program. He is a graduate of Medical School, Alexandria University. He finished his Critical Care fellowship at Memorial Sloan Kettering Cancer Center, and Pulmonary Critical Care Fellowship at St. Vincent Hospital and Medical Center in New York. Other degrees include European Diploma of Intensive Care Medicine, and Diploma of Tropical Diseases, Royal College of Surgeons, Dublin, Ireland. Main Research interest include noninvasive ventilation, thromboembolic disease, and COPD. His research experiences include multiple presentations, publication of abstracts, papers, and book chapters that address different topics of pulmonary and critical care medicine.

7th International Conference on COPD and Lung Health, October 20, 2020