

Cardiovascular Disease - Assessment

Wednesday, October 27, 2004

12:30 PM - 2:00 PM

Acoustic Imaging of the Lungs in Patients with CHF and Pulmonary Congestion of Varying Severity - Report of Preliminary Observations with the PALIScope System

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PURPOSE: The main methods used to assess Congestive Heart Failure (CHF) patients include clinical history, physical examination, pulse-oximetry and Chest-X-Ray (CXR). The PALIScope (Passive Acoustic Lung Imaging) is a bedside, noninvasive radiation-free device that provides dynamic functional and potentially structural lung imaging. Our purpose was to evaluate the PALIScope technology in the diagnosis, management and monitoring of CHF patients with various degrees of pulmonary congestion.

METHODS: Nine patients (Age, avg. 66 ± 11 y) with severe CHF due to systolic LV dysfunction (NYHA class II, III,) were enrolled. Each patient was assessed three times (on admission, 4 hours following treatment and before hospital discharge) by physician, pulse-oximetry and PALIScope. On admission and prior to discharge, CXR, Blood tests and Echocardiography were performed. The PALIScope images are based on the lungs acoustic response during a breathing cycle. The acoustic energy is collected simultaneously by 40 sensors that are adhered to the patient's back. PALIScope images were compared to nine healthy controls.

RESULTS: The underlying reason for CHF was acute MI (five patients) and dilated cardiomyopathy (four patients). All patients were dyspneic (RR 25 ± 3 /min). Lung crepitations, wheezing and peripheral edema were noted in nine, three and five patients respectively. CXR revealed Lung congestion and pleural effusion in seven and two patients respectively. Analysis of the PALIScope image by three independent observers revealed: On Admission: Lung ventilation was markedly reduced in all patients. Ventilation of lower lobes was intensely affected relative to other lobes. Sequence of lung air-flow was disynchronous. Ventilation of one lung in five patients was intensely affected as compared to the other lung. Effective treatment was associated with remarkable improvement in all aforementioned parameters.

CONCLUSION: Acoustic lungs imaging may provide accurate noninvasive radiation-free method for diagnosis, management and monitoring CHF patients.

CLINICAL IMPLICATIONS: Fluid retention and volume overload are implicit to CHF, therefore temporal changes evaluation in pulmonic vascular engorgement, interstitial and alveolar edema are desirable. The PALIScope technology may prove highly valuable and provide such an assessment technology.

DISCLOSURE: G. Keren, Deep Breeze Ltd.

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