swisstom
Now I can see.

Comparison of regional and global expiratory time constants measured by electrical impedance tomography

A Waldmann, S Böhm, W Windisch, S Strassmann, C Karagiannidis; 36th International Symposium on Intensive Care and Emergency Medicine, Brussels 2016, P254

Abstract: http://www.intensive.org/admin/upload/abstract/1079190566/P/P254.pdf
Poster: http://isicem.esn.eu/posters_listing/see_poster/35/2016/

Comparison of regional and global expiratory time constants measured by electrical impedance tomography (EIT)

A.D.Waldmann[1], S.H.Bohm[1], W.Windisch[2], S. Strassmann[2], C. Karagiannidis[2]
[1]Swisstom AG, Switzerland, [2]Kliniken der Stadt Köln, Pneumology and Critical Care Medicine, Ostmerheimer Str. 200, 51109 Cologne, Witten/ Herdecke University Germany

INTRODUCTION

Although regional compliance (C) and resistance (R) can vary considerably between different lung regions, traditional pulmonary function tests can measure global values, only. To overcome this drawback we recently proposed a novel EIT-based method to estimate regional expiratory time constants (τ = tau) [1]. In this abstract regional values were compared with global ones.

METHODS

In ten intubated patients with hypoxemic and hypercapnia lung failure time constants (τ = R·C) were estimated from global and regional volume EIT signals obtained by *Swisstom BB²* (Swisstom, Switzerland). A first order exponential decay model was fitted to each regional and global impedance curve, see Fig 1 and Fig 2.

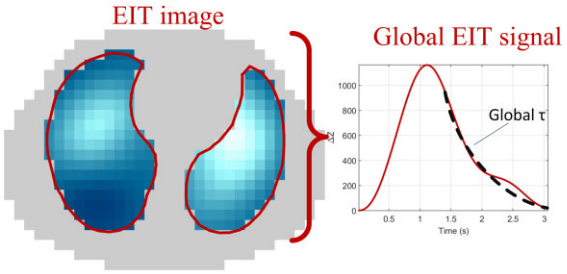

Fig 1: Left: tidal image. Right: global impendace curve calculated as the sum of all regional pixels.

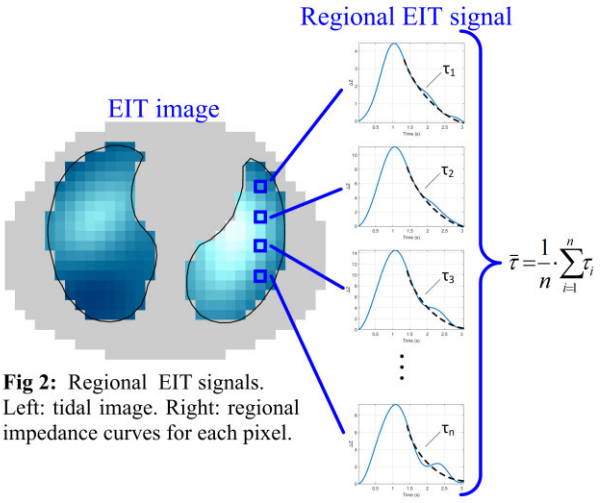

Fig 2: Regional EIT signals. Left: tidal image. Right: regional impedance curves for each pixel.

RESULTS

The spread and mean of regional τ values are depicted in Fig. 3 and compared with the one τ value derived from the global signal. ARDS lungs exhaled "faster" whereas COPD lungs were "slower", the latter reflecting the predominance of airway obstruction. ARDS patients show only minor regional differences and global τ corresponded perfectly with the mean τ derived from different lung regionals. In contrast, COPD patients showed a large spread of their regional τ values. Nonetheless, the mean of the regional τ values corresponded well with global τ.

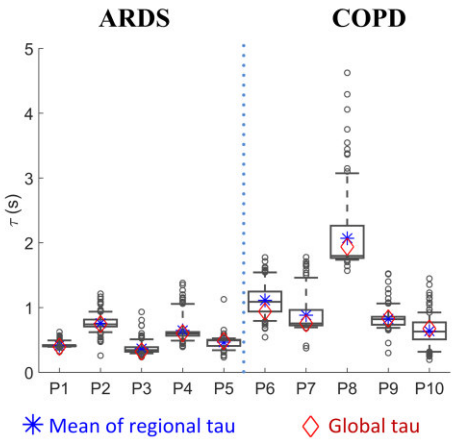

Fig 3: Box plot of regional tau distribution for 10 patients (whiskers represent all points between 5% and 95%). Mean τ from regional values (blue star) is plotted together with the τ from the global EIT signal (red rhomboids).

DISCUSSION

Mean expiratory time constant derived from regional EIT signals was similar to the one value calculated from the global EIT signal in both, patients with short (ARDS) and long expiration time requirements (COPD). As a sign of heterogeneous disease, the latter showed a wide spread of regional τ values.

REFERENCES

[1] Roka et al., "Expiratory time constants by electrical impedance tomography inhypoxemic and hypercapnic acute lung failure – a feasibility study" Intensive Care Medicine Experimental 2015, Volume 3 Suppl 1

swisstom
Now I can see.

ISO 13485
Made in Switzerland

Swisstom AG

Swisstom AG, located in Landquart, Switzerland, develops and manufactures innovative medical devices. Our new lung function monitor enables life-saving treatments for patients in intensive care and during general anesthesia.

Unlike traditional tomography, Swisstom´s bedside imaging is based on non-radiating principles: Electrical Impedance Tomography (EIT). To date, no comparable devices can show such regional organ function continuously and in real-time at the patient's bedside.

Swisstom creates its competitive edge by passionate leadership in non-invasive tomography with the goal to improve individual lives and therapies.

Contact us!

call: + 41 (0) 81 330 09 72
mail: info@swisstom.com
visit: www.swisstom.com

Swisstom AG
Schulstrasse 1, CH-7302
Landquart, Switzerland

Content: Dr. Stephan Böhm; Concept & Design: Zweizeit Brand Development

Real-time tomographic images for organ function monitoring and diagnosis

eit inside ® electrical impedance tomography