

The Artificial Fluctuation of Electrical Impedance Tomography Tracings Induced by Air-Flow Mattress



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Summary

Electrical impedance tomography (EIT) is a bedside, real-time and radiation-free monitoring technique for the dynamic change of the global and regional gas volume in the thoracic cage.

EIT was set up to guide the ventilation settings of a 56-year-old male undergoing volume-controlled ventilation due to acute respiratory distress syndrome. The patient was sedated and paralyzed. After establishing the EIT system, we found a periodical

fluctuation of EIT tracings (Figure 1a), while the settings of the ventilator did not change, and no spontaneous breathing were detected. At the same time, the air-flow mattress was used to prevent pressure ulcers. The rhythm of the inflation-deflation of the air-flow mattress was 10 min, which was the same as the time interval of the fluctuation in EIT tracing. After turning off the mattress pump, the fluctuation of the EIT curve disappeared.

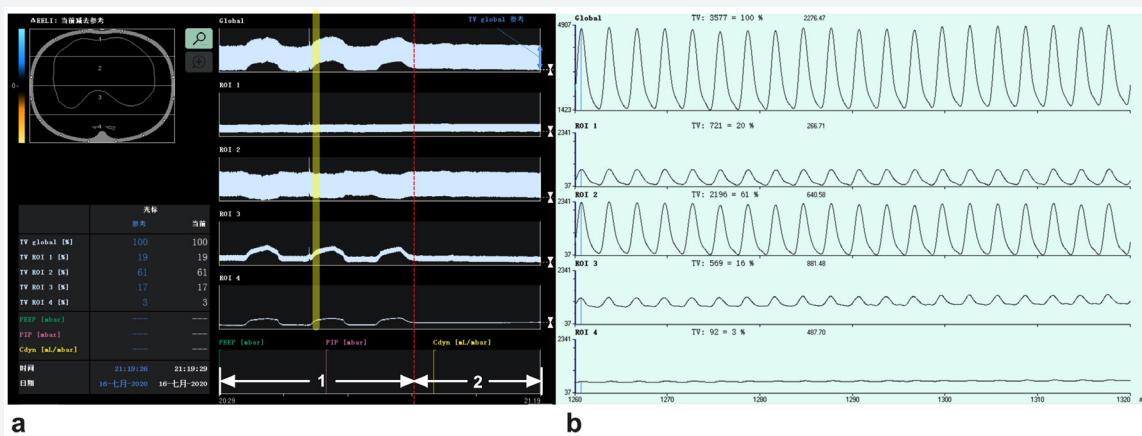


Figure 1: Panel a: Screenshot of the real-time display of electrical impedance tomography (EIT) during the entire monitoring. In section 1, periodical fluctuations are displayed in global and regional impedance changes, with the same rhythm of inflation-deflation of the air-flow mattress. The red dashed line indicates the turning off the mattress pump. Periodical fluctuations on EIT tracings are disappeared in section 2. Panel b: Offline analysis of EIT tracings by a dedicated software displaying the segment selected in Panel a (yellow shaded area). The display window is set as 60 sec. The artificial fluctuation could not be easily detected. (This figure was created by GraphPad Prism 8.2.).

EIT data analysis is usually performed offline. When the time scale in the EIT analysis software was displayed lower than 60 sec, such artificial fluctuation could not be identified easily (Figure

1b). This case reminds clinicians and researchers to check external artificial sources during EIT monitoring, especially for the air-flow mattress which is commonly used in critically ill patients.



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