The influence of diaphragm paralysis on regional ventilation

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Rationale

Functional Respiratory Imaging (FRI) is able to personalize respiratory treatment based on regional ventilation in patients with unilateral diaphragmatic paralysis (UDP) (Van Holsbeke, Respiratory Care 2013). In this larger dataset we aimed to assess in detail the regional ventilation of the lung at the side of the paralysis.

Methods

5 patients with UDP were included in this trial. All patients underwent FRI to investigate regional ventilation. The lobar expansion from functional residual capacity (FRC) to total lung capacity (TLC) was considered as a measure for regional ventilation.

Results

For all patients (5 male, mean age 57±4.5 years, mean FEV1 58±9.0 %predicted) the reconstructed lobes at FRC and TLC can be found in figure 1. Diminished regional ventilation of the lung at the side of the paralysis was observed in all patients (mean 30.4±8.2 % of total), especially in the lower lobe (mean 6.9±5.8 % of total). A large heterogeneity in flow distribution towards the lower lobe at the side of the paralysis was observed (5.5-11.1-1.9-14.9-1.3% of total).
Conclusion

FRI shows clearly a diminished regional ventilation at the side of the paralysis with a large heterogeneity in flow distribution for the lower lobe at that side, with virtual no flow reaching in 2/5 patients. This could be of clinical importance since a disturbed local ventilatory status can be essential in clinical decision making between a conservative or surgical approach.

Figure

Figure 1 Lobar volume at FRC (left) and TLC(right) for all patients