

1 **Combined effects of leaks, respiratory system properties and upper airway patency on**  
2 **the performance of home ventilators: A bench study**

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4 and Gabriel Roisman

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7 **Additional File 5: Example of patient-ventilator asynchronies with closed upper airways**

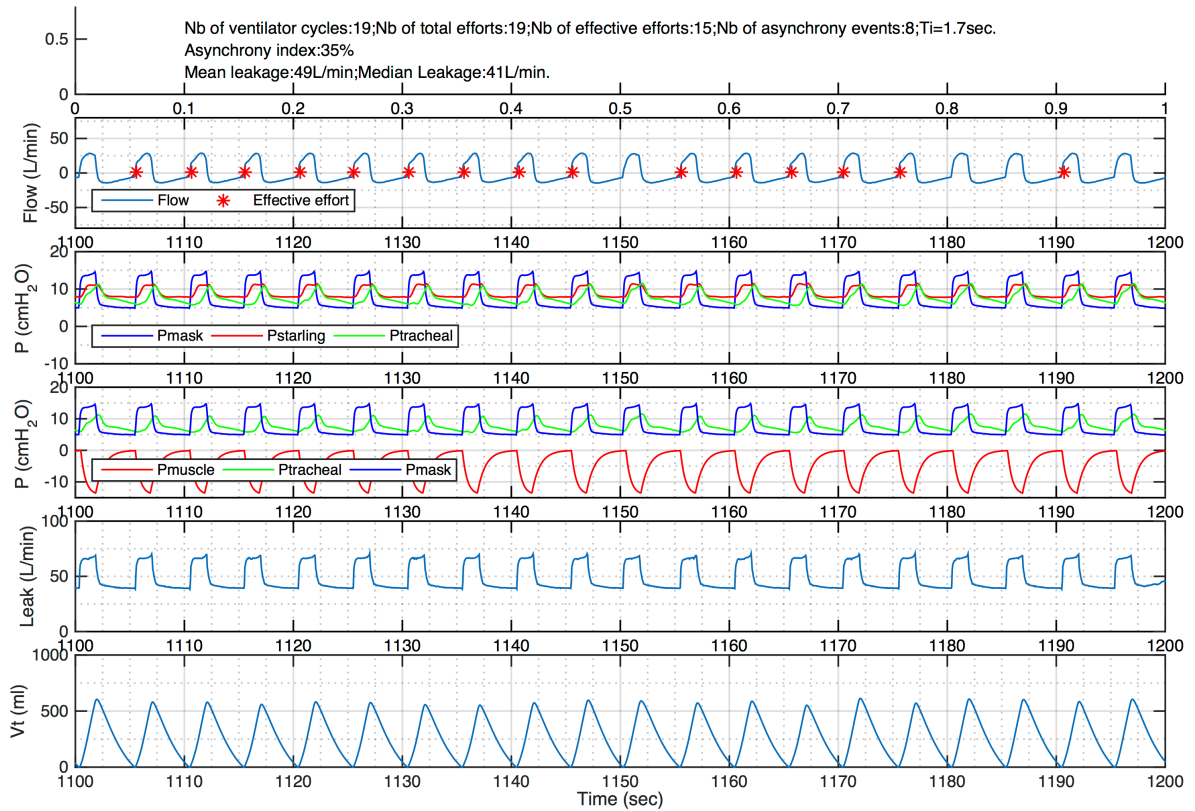


Figure S5-V1

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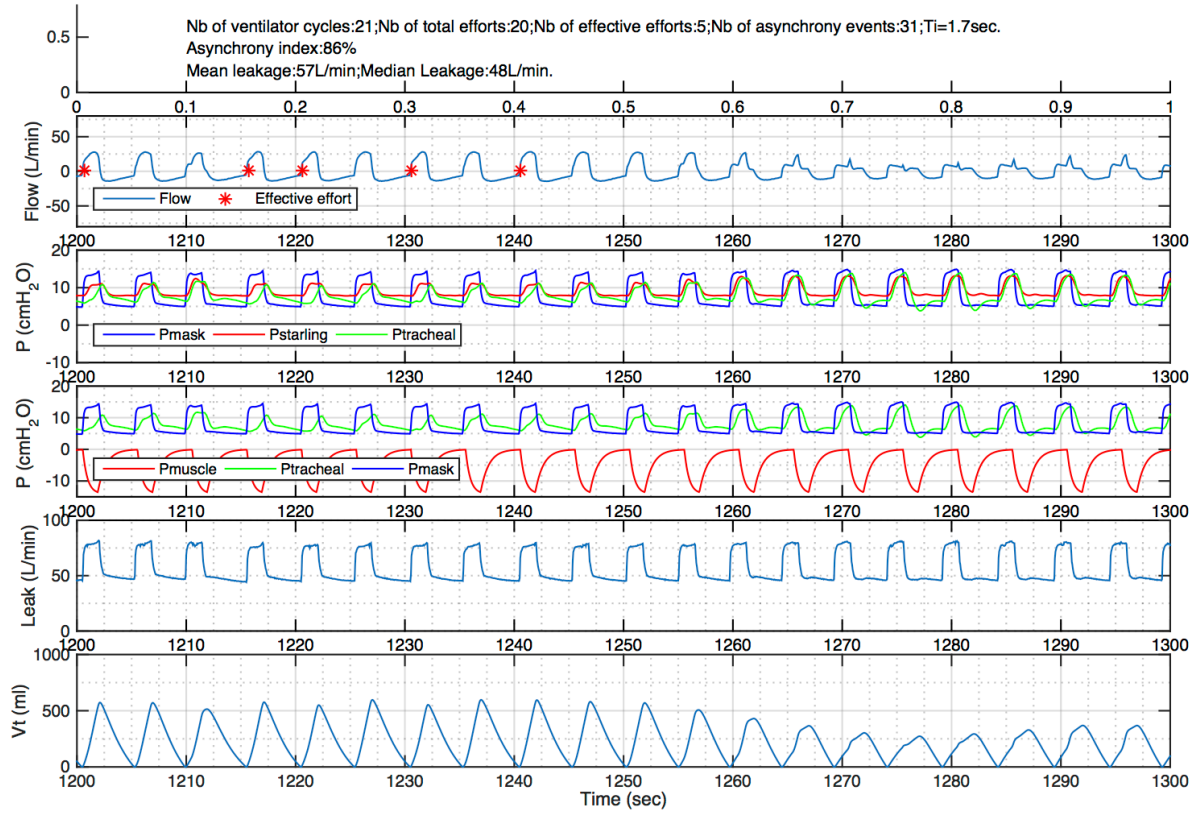


Figure S5-V2

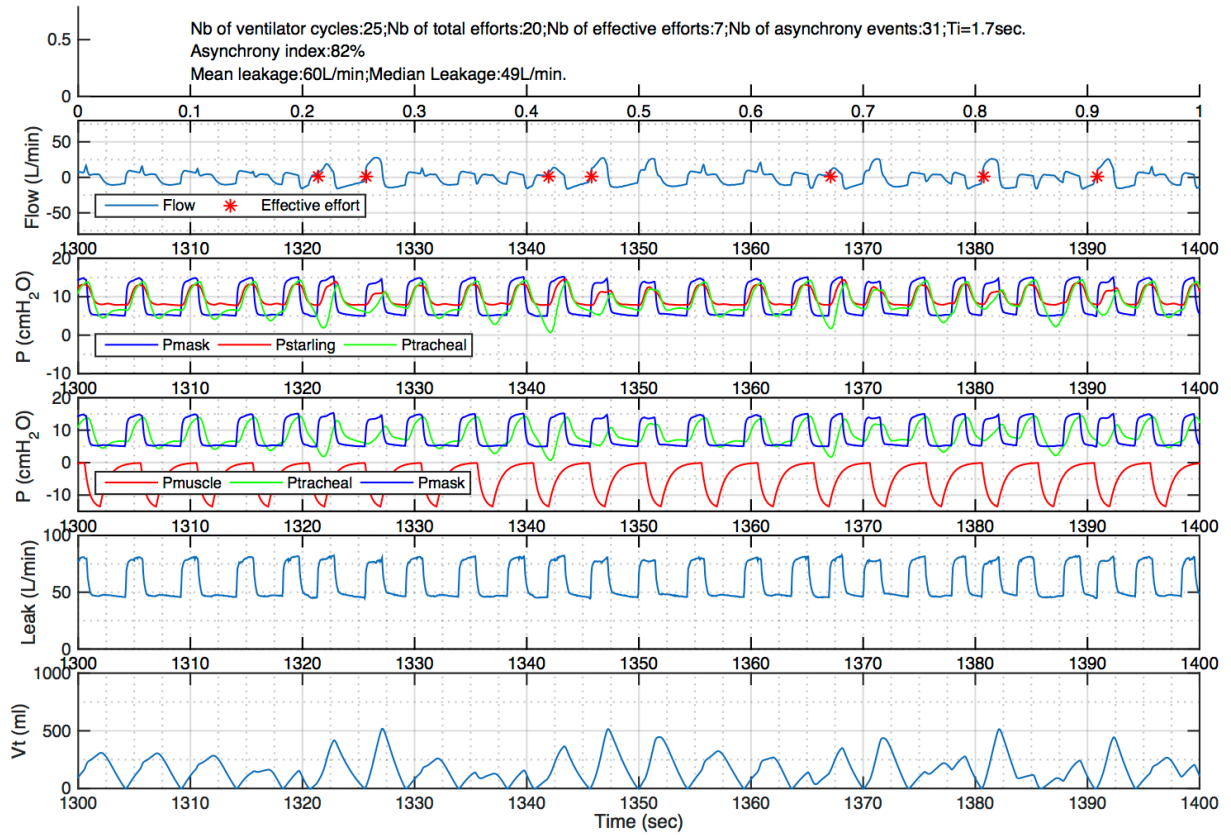


Figure S5-V3

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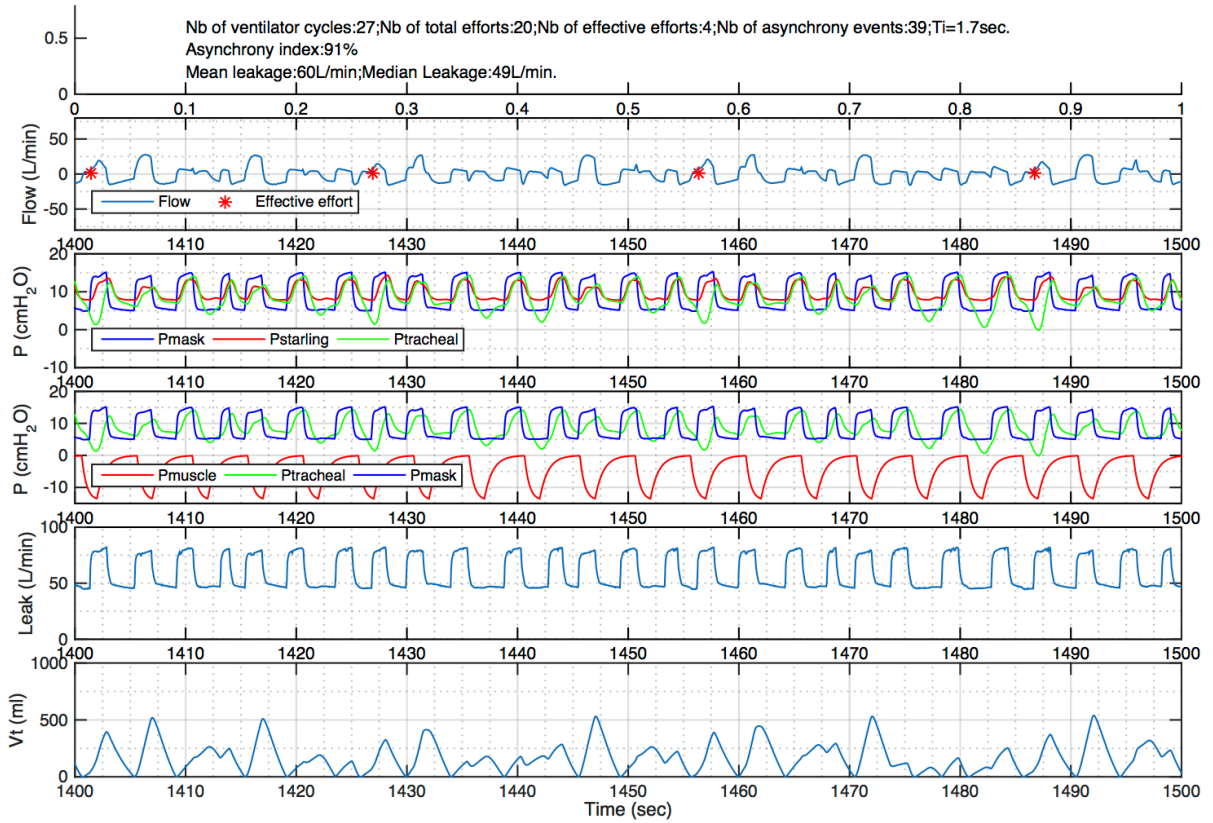


Figure S5-V4

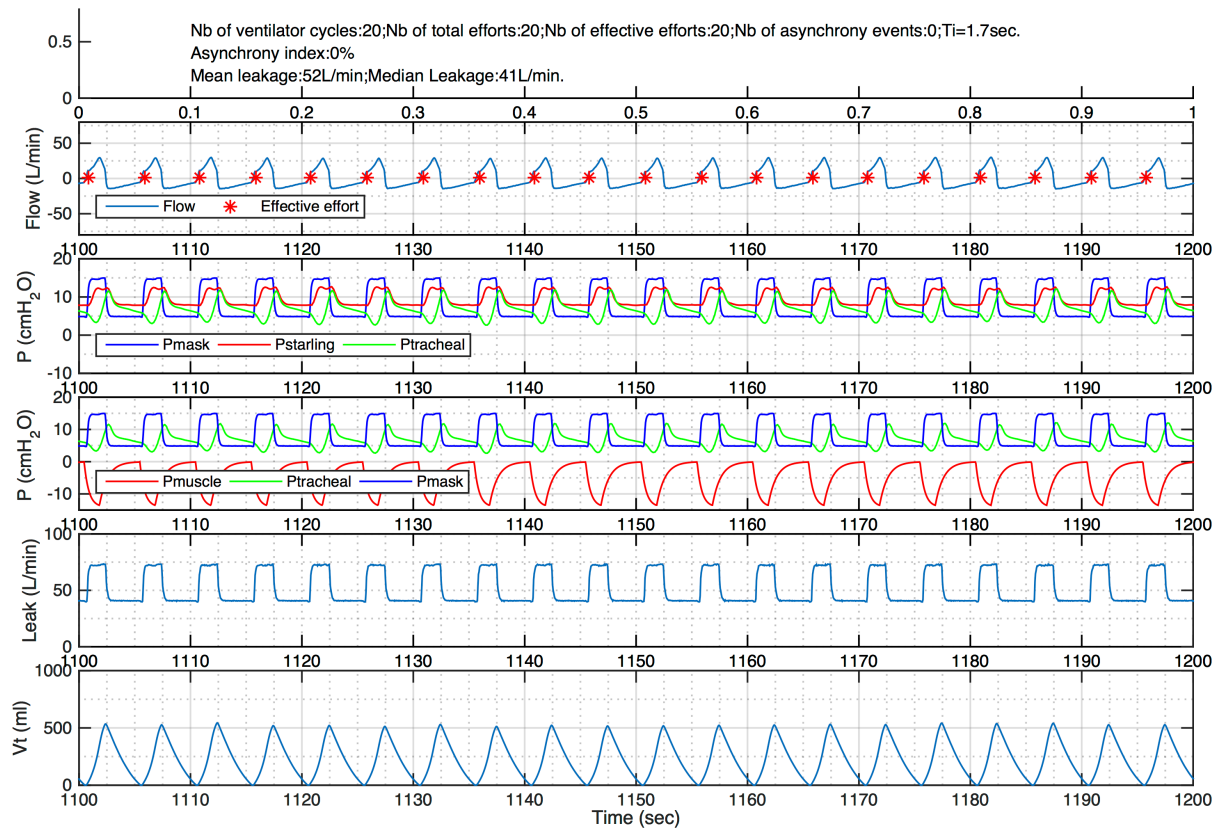
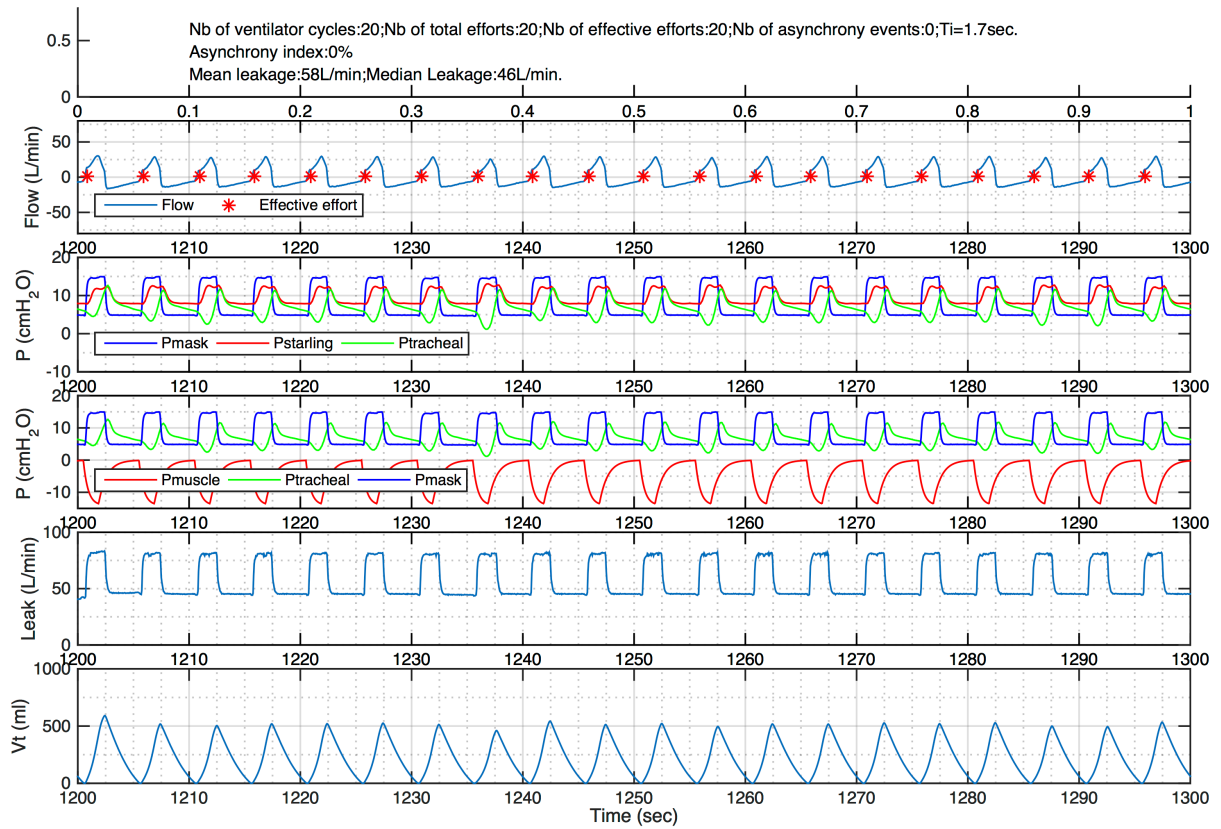


Figure S5-T1

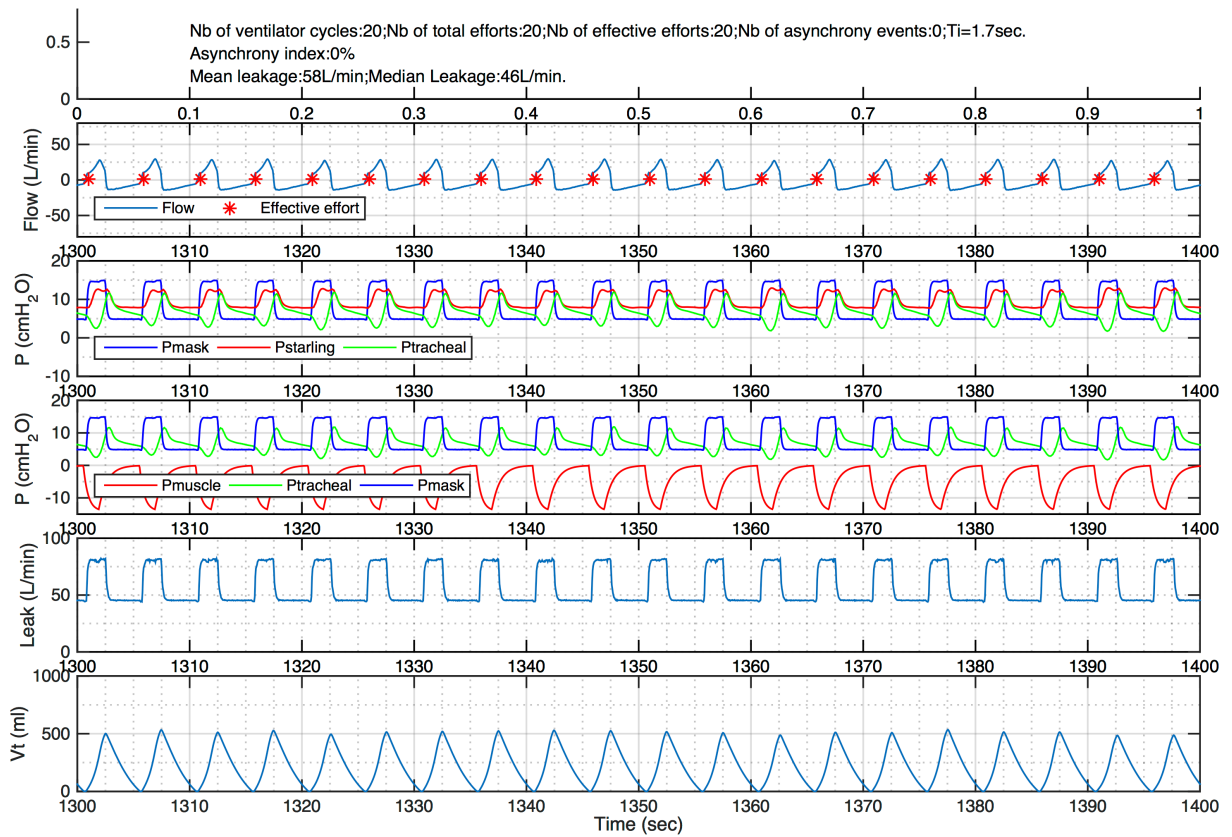
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Figure S5-T2



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Figure S5-T3

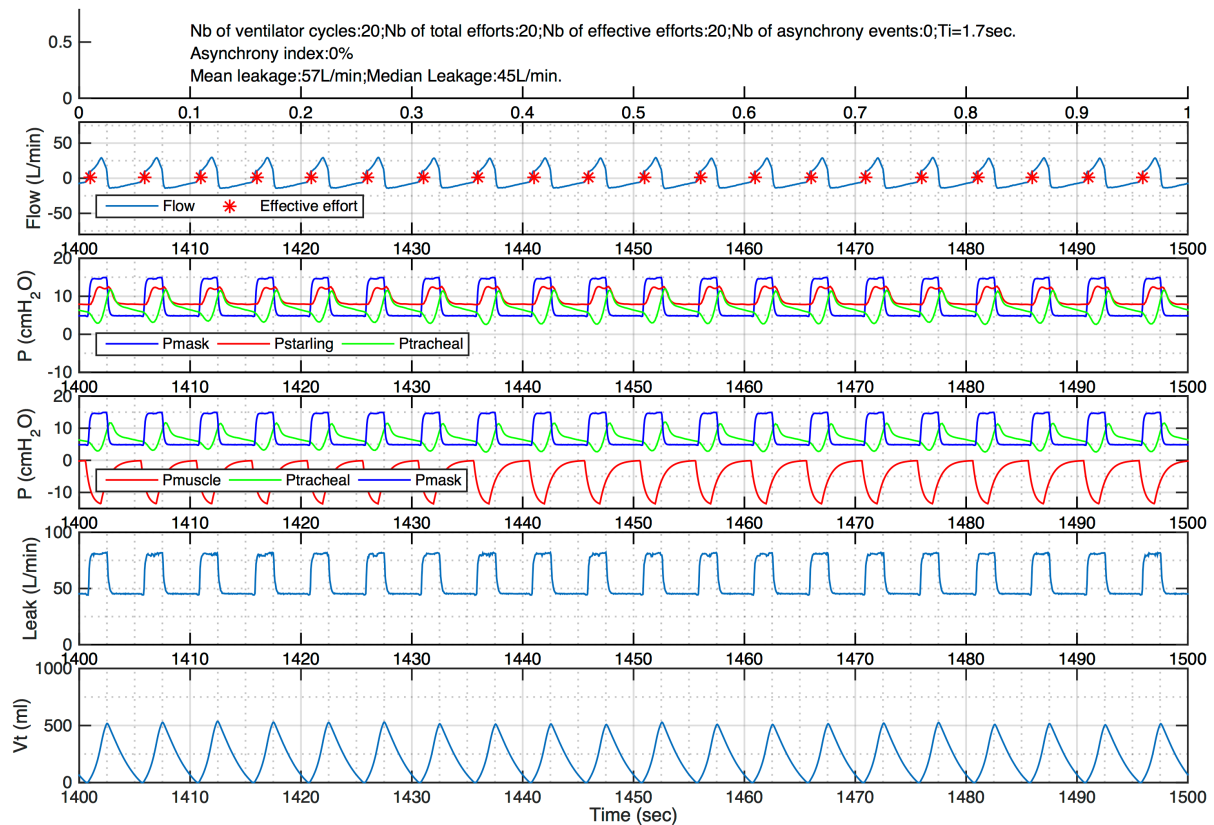


Figure S5-T4

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4 Figures S5 V1-4 and T1-4 show mask flow, mask pressure (Pm), tracheal pressure (Ptr), inspiratory  
5 muscular pressure (Pmus), total leak and calculated tidal volume ( $V_T$ ) during period between 1100<sup>th</sup> to  
6 1500<sup>th</sup> second during the tests of V60 (V1-4) and T100 (T1-4) under COPD condition with closed  
7 upper airways. During the period shown in the figures, the two devices were subjected to similar total  
8 leak levels: from 1100<sup>th</sup> to 1200<sup>th</sup> second, median leak was around 41 L/min; at 1200<sup>th</sup> second, leak  
9 was manually increased to around 48 L/min. The evolutions of patient-ventilator interaction during  
10 this increase of leak are thus shown in the figures.

11 For V60, the inspiratory trigger was 6. When leak level was around 41 L/min, 15 out of 19 inspiratory  
12 efforts were effectively addressed by pressure supports sent by the ventilator, and the amount of  
13 asynchrony events was not significant. A similar level of Ptr to Pm indicated that the upper airways  
14 remained at least partially opened. The  $V_T$  reached around 600 ml. When the leak increased to 49  
15 L/min at 1200<sup>th</sup> second, the ventilator cycles began to desynchronize to the simulated patient's  
16 breathing efforts (decreases in Pmus). Ineffective inspiratory efforts appeared leading to asynchrony  
17 and a consequent decrease in delivered  $V_T$  (from the 1255<sup>th</sup> second). Later, high frequency ventilatory  
18 cycles were auto-triggered, leading to a decrease in delivered mean  $V_T$  (from 1320<sup>th</sup> second, minimum  
19 value around 250 ml). As the breathing rate of active lung model was unchanged, an auto-triggered  
20 ventilatory cycle could occur by chance at a similar or a same moment when the inspiratory effort took

- 1 place. Consequently, an increase in  $V_T$  could be observed which was, however, completely accidental
- 2 (e.g., at 1327<sup>th</sup> second, 1347<sup>th</sup> second, etc.).
- 3 The corresponding curves of T100 under similar conditions are comparatively shown in the figure.
- 4 The inspiratory trigger of T100 was 4. No asynchrony events occurred.
- 5