

A-7 EFFECTS OF DIFFERENT TRIGGERING SYSTEMS AND EXTERNAL PEEP ON TRIGGER CAPABILITY OF THE VENTILATOR .

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[INTRODUCTION] Triggering capability of either pressure or flow triggering system during pressure support ventilation (PSV) was compared on the basis of equal sensitivity being preset for both systems. Under these conditions, the effect of externally applied PEEP, weak inspiratory drive, and airleak on triggering delay was evaluated.

[METHOD] The Servo 300 ventilator with either pressure or flow sensing mechanism was connected to a two bellows-in-series type lung model with various mechanical properties. Lung compliance (C_L) and chest wall compliance was 0.03 and 0.12 L/cmH₂O, respectively. Airway resistance (R_{aw}) was varied as 5, 20, or 50 cmH₂O/L/sec. RR was 15 breath/min., I/E was 1:3. No auto-PEEP was developed. Sensitivity level was equalized for both systems resulting in similar triggering time at PS level 16 cmH₂O, PEEP 0cmH₂O, and R_{aw} 5 cmH₂O/L/sec. Then, with or without airleak at this fixed sensitivity R_{aw} , PEEP level, and inspiratory drive (P_{driv}) were subsequently changed. PS level varied to deliver the V_T 470ml. Triggering time was compared between the sensing systems.

<RESULTS>. The magnitude of inspiratory effort, externally applied PEEP, and airleak were the factors affecting triggering time. However, there were no differences in triggering time between flow or pressure triggered PSV with varied R_{aw} . As shown in Table, triggering time was significantly increased in pressure sensing system by adding 5 cmH₂O PEEP, while no difference was observed in the flow sensing system between 0 and 5 cmH₂O PEEP. At 10 cmH₂O PEEP, triggering time was significantly increased in both systems. Changing the magnitude of

inspiratory effort in pressure sensing system resulted in an increase in triggering time. In the presence of airleak triggering time was decreased in both systems. Adding 5 cmH₂O PEEP caused auto-cycling.

Triggering time alteration observed during changing magnitude of inspiratory drive, PEEP application, or airleakage was smaller in flow triggered PSV than that in pressure triggered PSV. The change in triggering time between the sensing systems can be caused by the presence of base flow and different sensing mechanism; the presence of base flow is an added threshold for pressure triggering, while it does not affect the threshold for flow sensing. An increase in airway resistance without auto-PEEP did not influence the triggering capability of both systems.

Table. Effect of PEEP on triggering time in pressure or flow triggering systems with different airway resistance

$R_{aw}=5 \text{ cmH}_2\text{O/L/sec}$			
PEEP level (cmH ₂ O)	0	5	10
Trig.time(ms), pr. trigg.	61.4±2.2	77.8±4.3*	89.8±2.0*
Trig.time(ms), flow trigg.	61.2±1.7	68.0±2.9†	75.4±2.1*†

trig. time: triggering time, pr. trigg.: pressure triggering, flow trigg.: flow triggering, C_L : 0.03 L/cmH₂O, RR: 15 breath/min., PS level: 17 cmH₂O, V_T : 470 ml. Values are mean± SEM, *p<0.0001 vs PEEP=0 †p<0.0001 vs pressure triggering

In summary, the evaluation of triggering time in both pressure or flow triggering systems with and without PEEP under the similar sensitivity demonstrated the comparable triggering capabilities, unless weak inspiratory drive and/or airleak is present.