Improved safety valve tested in vivo.

Does the intelligent ventilator safety valve interfere with patient ventilation?

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Aim of the study

The intelligent Ventilator Safety Valve (VSV) opens when pressure exceeds 20 cmH2O for more 6 seconds. This new VSV protects against prolonged increases in airway pressure.

However does it interfere with some manual ventilation modes where a need for prolonged increased airway pressures exists?

Goal of the study was to use the safety valve during normal ventilation, during difficult manual facemask ventilation and during manual squeezing of the lungs after extra corporeal circulation (ECC).

Methods and Analysis

- The safety valve is inserted in the breathing circuit of an anaesthesia ventilator. During a period of one month the alarms of the safety valve, if any, are noted.
- A first group of ten male patients was chosen due to an expected difficulty for manual face mask ventilation based on an elevated BMI. No clinical need for a rapid sequence induction existed. Fresh gas flow was set at 12 litres/min and the adjusted pressure limiting valve (APL) was turned to maximum during manual ventilation.
- A second group of 10 patients needed an extra corporeal circulation (ECC) and had during controlled mandatory ventilation peak airway pressures above 30 cm H2O. Manual squeezing was needed until total visual expansion of the lungs at the end of the ECC.
- Maximum time of airway pressures above 20 cmH2O and opening of the VSV is noted in last two groups.
- Approval from the hospital ethical committee was obtained.

Results

- The VSV never opened in the three settings.
  - No interference with manual and controlled ventilation
- The maximum time of airway pressures continuous above 20 cmH2O was never longer than 3 seconds in the last two experiments.
  - A mean of 0.6 seconds with a stdv of 1.2 in the face mask ventilation
  - A mean of 1.3 seconds with a stdv of 0.8 in the squeezing of the lungs after ECC.

Conclusion

- The intelligent VSV never opened during controlled ventilation, during manual ventilation or during squeezing of the lungs.
- The 6 seconds of the VSV was a lot longer than what is clinical necessarily.
- The VSV can be safely used.