The adequacy of gas flow for transtracheal ventilation via cricothyroid puncture in different oxygen sources

Tanit Virankabutra MD, Kulawat Jirapat MD, Vijitporn Taenumtrakool MD

Department of Anesthesiology, Faculty of medicine Ramathibodi Hospital

---

Background : Percutaneous transtracheal ventilation using a large IV catheter inserted through the cricothyroid membrane is a simple rescue technique for “cannot intubate, cannot ventilate” situation. Oxygen sources and IV catheter sizes are considered as the major factors for effective ventilation.

Methods : We measured gas flow rate through different oxygen sources and IV catheter sizes. The evaluated oxygen sources consisted of homemade jet ventilator with driving pressure of 20 , 30 , 40 , 50 psi , oxygen flush valve from anesthesia machines(Excel 210SE , Datex-Ohmeda Aestiva/5 compact plus , Drager Fabius GS) and self inflating bag (AMBU).

Results : Homemade jet ventilator with driving pressure 30-50 psi could deliver sufficient gas flow through IV catheter 12-16 G (range 411 - 1218 ml/sec). All oxygen flush valve from anesthesia machines also delivered sufficient gas flow but through IV catheter 12-14 G only (range 357 - 825 ml/sec), on the other hand, AMBU did not deliver adequate gas flow through IV catheter 12 - 16 G. This is statistically significant for gas flow rate increased with increasing IV catheter sizes diameter ($p < 0.001$)

Conclusion : Homemade jet ventilator with driving pressure 30-50 psi and oxygen flush valve from modern anesthesia machine may supply adequate gas flow via oxygen tubing(non-compliance circuit); however, the size of IV catheter must be appropriately chosen to conform with each type of oxygen sources in order to supply adequate gas flow for maintaining the oxygenation and ventilation.