

Category : **Respiratory: mechanical ventilation**

## **A42 - Regulation of a device for emergency transtracheal lung ventilation**

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### **Introduction:**

In cannot-intubate, cannot-ventilate situations, a lung ventilation through a thin transtracheal cannula may be attempted. However, it may be impossible to achieve sufficient ventilation if the lungs are spontaneously emptying through a thin transtracheal cannula and dangers of barotrauma may occur. Here we present a program for an automatically controlled version of a valve - a bi-directional manual respiratory pump - where a combination of low flow during inspiration, by reducing gas supply to the valve, and increased flow during expiration, by increasing gas supply to the valve, permits more effective venturi effect and efficient expiration, with low total gas consumption.

### **Methods:**

The theoretical performance of the valve was modeled mathematically. The effectiveness of the valve that was predicted by the mathematical model was tested in vitro with a standard valve but by variable flow rates.

### **Results:**

**(See the illustration) Timer –Trigger comprises of Solenoid valve 1 OXYGEN , Solenoid valve 2 OUTPUT , Solenoid valve 3 AIR COMPRESSOR**

- 1. General mode – controlled Inspiration, During expiration, the solenoid valve 1 (oxygen) is closed (to save oxygen). With the solenoid valve 3 (air) open, the compressor air at the constant start ensures expiratory aid.**
- 2. Security - Assist mode (Trigger) Safety – OVER-PRESSION: FORCED EXPIRATION**
- 3. Safety - NEGATIVE PRESSURE - Trigger: + - FORCED INSPIRATION, Safety - APNEA - FORCED INSPIRATION**
- 4. CICV mode the solenoid valve 2 and 3 (air compressor tube - ensures extra start during expiration) are the same.**

### **Conclusion:**

Satisfactory lung ventilation can be assured with transtracheal ventilation with a bidirectional manual respiration valve with variable gas flow.

### **References:**

Konrad Meissner, et..Pavlovic, D, *Anesthesiology*. 2008 Aug;109(2):251-9.

**Image :**

