A Simple Modification to Boyle's Anaesthesia Machine

Wg Cdr S Anant*, Col HS Nanda*

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Introduction

The Boyle Anaesthesia Machines of Datex Ohmeda Boyle Basic or Boyle Tec make (Fig-1), are in use and during induction, there is a necessity to switch over from bag on open system to ventilator on closed system. This involves change of "lever" provided in the machine to the relevant system, change of corrugated tubing and connection to ventilator increasing the chances of operator error [1]. In many places, the common practice is to go on the "Open system" and after stabilization of the patient on manually controlled ventilation, the system is changed to "Closed system" and patient is switched on ventilator (Datex Ohmeda 7000).

A Bag / Ventilator Selector Valve or Switch in newer machines provides a convenient method to shift rapidly

Fig. 1: Boyle Tec Anaesthesia machine with closed circuit and Ohmeda ventilator

between manual or spontaneous respiration and automatic ventilation without removing the bag or ventilator hose from its mount. Selector valve is essentially a three way stop-cock, one port is connected to the breathing system, the second is connected to the bag mount and the third port is attached to the ventilator hose [2]. There is no provision of selector valve in the existing Boyle Basic Anaesthesia machine and a simple modification using easily available equipment / parts is suggested for quick switch over between manually controlled ventilation with bag or ventilator.

Equipment and its assembly

Two Bag mounts (available with Mapleson 'A' circuits of old models of Boyle's Machine) are connected end to end constituting the bag mount assembly (Fig-2).

Machine end connector of a Bain's circuit (22 mm Male) with the rubberized end of the piston of a 20 ml syringe blocking the connector is attached to one end of the bag mount assembly (Fig-2 inset). The other end of the bag mount assembly is connected to the 22 mm bag/ventilator connection port of the circle absorber (Fig.

Fig. 2: Bag-mount assembly connected to circle absorber. Inset - Dismanteled bag-mount assembly

*Classified Specialist (Anaesthesiology), *Senior Advisor (Anaesthesiology), Command Hospital, Air Force, Bangalore-07

Fig. 3 : a. Bag-mount, b. To ventilator, c. Reservoir bag closed circuit, d. CO₂ absorber, e. Unidirectional valve

2). The two remaining ports of the bag mounts are connected to ventilator hose and a reservoir bag respectively (Fig-3 b & c).

Method of use and authors experience

The two levers on the bag mounts act as selector valves/switches for bag or ventilator. The levers must be properly labelled as “Bag” and “Ventilator”. Lever

positions must be marked “OFF” / “ON” for ease of use and to avoid operator error. With this modification in place all one has to do is that, keeping the machine lever in “closed system”, the lever of the bag mount marked “Bag” is activated by raising the lever marked “Bag” to “ON” and patient is manually controlled.

The switchover from manually controlled ventilation to controlled ventilation with ventilator is made by lowering the “Bag” lever to “OFF” and raising the “Ventilator” lever to “ON”.

A line diagram (Fig 3) depicts the relationship of the “modification” with the closed circuit system. Thus, change over from manually (bag) controlled ventilation to that by ventilator can be done without having to change from open system to closed system.

A Boyle anaesthesia machine of Boyle Tec and Boyle Basic (Datex Ohmeda) make, with the modification described above, has been in use at 7 Air Force Hospital Kanpur & CHAF Bangalore for the last two years and has been easy and convenient to use.

References

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