METHOD AND APPARATUS FOR REPLACING A PLACED ENDOTRACHEAL TUBE

TECHNICAL FIELD

This invention relates to medical devices and particularly to method and apparatus for replacing a placed endotracheal tube.

BACKGROUND OF THE INVENTION

Presently, the replacement of an endotracheal tube placed in a patient includes disconnecting the endotracheal tube from a ventilator and inserting a sealed endotracheal obturator into the airway of the tube. The obturator is passed completely through the endotracheal tube and into the trachea of the patient. The endotracheal tube is then removed from the trachea of the patient over the obturator while the obturator remains in the trachea of the patient. Since the tissue surrounding a chronically placed endotracheal tube often becomes inflamed, an obturator is positioned in the passageway of the endotracheal tube to provide a guide for inserting the replacement tube through the inflamed tissue of the patient's airway. Furthermore, the patient's airway tissue may have become so inflamed as to completely encapsulate the obturator and essentially cut off air flow to the lungs. In many cases, the replacement endotracheal tube is simply inserted over the positioned obturator and quickly inserted into the patient's airway. As a result, ventilation of the patient is restored without any adverse affect to the patient. The obturator is withdrawn from the replacement endotracheal tube, and the replacement endotracheal tube is connected to the ventilation apparatus to resume normal ventilation of the patient.

However, during this replacement procedure, it is not uncommon to encounter problems in the insertion of the replacement endotracheal tube. The tissue of the patient's airway passage may have become so inflamed so as to make the insertion of the replacement endotracheal tube a time-consuming process even with the obturator positioned in the patient. The insertion of the replacement endotracheal tube may also cause trauma or bleeding to the airway passage tissue further complicating the replacement process. The physician can readily accommodate these complications; however, time becomes a critical factor when the inflamed tissue has entirely blocked the airway preventing normal ventilation of the patient.

Instead of a sealed obturator, physicians have been known to cut off a length of medical grade tubing with an airway therein to serve as an endotracheal tube obturator. In those instances where the physician is aware of the severely inflamed tissue condition, this tube provides limited ventilation of the patient during the replacement procedure. However, the cut-off tube does not have any fitting or connector for connection to ventilating equipment during the replacement procedure. Furthermore, the distal end of this makeshift obturator often becomes blocked with mucous as the tube extends beyond the distal end of the endotracheal tube. Such blockage is commonly unknown to the physician until the endotracheal tube is removed. As a result, the makeshift obturator does not alleviate the ventilation problem during a prolonged replacement procedure and, in fact, prolongs the procedure due to it being more flexible than most endotracheal obturators.

SUMMARY OF THE INVENTION

The foregoing problems are solved and a technical advance is achieved with illustrative method and apparatus for replacing an endotracheal tube placed in a patient. The apparatus includes an obturator tube having an airway therein, which is insertable into the passageway of the endotracheal tube for ventilating the patient during replacement. Furthermore, the apparatus includes a removable connector positioned about the proximal end of the obturator tube for connection to a ventilator. This removable connector also has a lock mechanism for ensuring continued connection with the obturator tube. As a result, this replacement apparatus advantageously provides a positive means of ventilating the patient during replacement of the placed endotracheal tube.

Illustratively, the method for replacing a placed endotracheal tube while maintaining ventilation of the patient includes disconnecting the placed endotracheal tube from the ventilator apparatus and connecting the obturator tube to the ventilator apparatus. The connection of the obturator tube includes the use of the removable connector which includes a standard ventilator fitting. The method further includes inserting the obturator tube into the placed endotracheal tube and removing the placed endotracheal tube from the patient over the obturator tube. The obturator tube is disconnected from the ventilator apparatus and the endotracheal removed from about the obturator tube. The disconnection step is facilitated by the use of the removable connector which is unlocked and removed from the proximal end of the obturator tube to permit removal of the removed endotracheal tube over the obturator tube. The replacement endotracheal tube is then inserted over the obturator tube with the obturator tube being reconnected to the ventilator apparatus utilizing the removable and lockable connector. The obturator tube and removable connector advantageously minimize the time period in which the ventilator apparatus is not providing positive ventilation of the patient. With the obturator tube providing ventilation of the patient during removal of the endotracheal tube and the insertion of the replacement, the physician has ample time for placing the replacement tube with minimal, if any, trauma to the already inflamed tissue of the patient's airway. After the replacement endotracheal tube is placed, the obturator tube is removed and disconnected from the ventilator apparatus. The ventilator apparatus is then reconnected to the patient.

The obturator tube of the replacement apparatus also includes one or more indicators positioned a predetermined distance from the distal end of the tube for indicating the position of the obturator tube in the placed endotracheal tube. In the illustrative embodiment, these indicators include a radiopaque substance which is painted on the outside of the obturator tube. This advantageously provides the physician with a visual indication of the depth of penetration of the obturator tube in the patient. Furthermore, the radiopaque indicator provides X-ray or other aided visualization of the obturator tube in the patient.

Should the distal end of the obturator tube become blocked with patient mucous, the obturator tube advantageously includes a plurality of side ports positioned about the distal end of the tube for further ventilating the patient during replacement of the endotracheal tube.