The use of the Montgomery T–tube in postprocedural subglottic stenosis repair

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The Montgomery T-tube is a device that supports the trachea and facilitates ventilation after laryngotracheal surgery. Because its use is sporadic, many anesthesiologists may not be familiar with this device, and its anesthetic management requires careful planning and discussion with surgeons. We describe the techniques of anesthetic management of exchanging endotracheal tube to Montgomery T-tube in case where upper tracheal stenosis exists. (Korean J Anesthesiol 2009; 56: 446–8)

Key Words: Airway, Montgomery T-tube, Tracheal stenosis, Tracheal stent.

The silicone Montgomery T-tube as a combined tracheal stent and an airway after laryngotracheal surgery was developed and described by William Montgomery in 1965. The vertical limb of the T-tube is intraluminal, whereas the horizontal limb is extraluminal, protruding through a tracheotomy orifice (Fig. 1). The tube is available in sequentially increasing sizes for children and adults, ranging from an external diameter of 4.5 mm to one of 16 mm [1]. As an alternative to tracheostomy tube, the T-tube provides nasopharyngeal respiration and phonation without injury to the vocal cords [2].

During the management of general anesthesia for patients undergoing laryngotracheal surgery, anesthesiologists may have to deal with patients who need insertion of a Montgomery tube. Numerous T-tube insertion techniques have been used with good success [1-6]. From the viewpoint of anesthesiologist, insertion of the Montgomery T-tube in exchange of the endotracheal tube after the operation is critical, because maintenance of ventilation, recovery of self-respiration and adequate sedation are all needed in this period.

We describe a case involving the Montgomery tube, and discuss their anesthetic management.

CASE REPORT

A 11-year-old male (height: 151 cm, weight: 69 kg) was admitted for postprocedural subglottic stenosis. Several previous surgeries had been undertaken and he currently had a 6.0 mm tracheostomy tube in situ. He developed a high tracheal stenosis at about 10–12 mm dorsal to inferior border of cricoid cartilage and was scheduled to undergo stenosis repair and insertion of a Montgomery tube. Routine monitors including...
EKG, noninvasive blood pressure, pulse oxymetry were used. The patient lay supine on the operating table and was preoxygenated with 100% oxygen via tracheal tube for 3 minutes. He was given 0.2 mg of glycopyrrolate intravenously before induction of anesthesia. Anesthesia was induced with intravenous thiopental sodium 350 mg and rocuronium 50 mg. Anesthesia was maintained using 2–3% sevoflurane (inspired) and 50% N\textsubscript{2}O in oxygen. Tracheostomy tube was removed and reinforced endotracheal tube 6.0 was introduced through tracheostomy port and ventilation was continued through endotracheal tube. The lungs were mechanically ventilated using an anesthesia machine (Primus, Dräger Medizintechnik GmbH, Lubeck, Germany) with a tidal volume of 10 ml/kg and 12 bpm.

At the end of the procedure, residual neuromuscular block was antagonized with IV pyridostigmine 10 mg and IV glycopyrrolate 0.4 mg. However, light inhalant anesthesia was maintained for adequate sedation. The endotracheal tube was removed after recovery of spontaneous respiration and then a size 8 mm Montgomery T-tube (Tracheal T-tube, Montgomery, Sewoon Medical Co. LTD., Cheonan, Korea) was inserted without any guide wire (Fig. 2). The patient’s respiration was well preserved through T-tube. He was allowed to wake up with O\textsubscript{2} via facial mask over the T-tube. During the operation, there was no specific event except scanty amount of bleeding.

**DISCUSSION**

The Montgomery T-tube is a T-shaped tube used in a tracheostomy to treat laryngeal and tracheal injuries. It serves as a stent and to provide an airway. The standard method of inserting the tube is direct placement by first inserting the lower intraluminal limb while the upper limb is compressed and then inserted [1]. The modified methods include railroading the T-tube over a Fogarty catheter, a gum elastic bougie, an umbilical tape or a nasogastric tube through an endotracheal tube or a rigid bronchoscope in situ [2,3,5].

Unlike standard tracheostomy tubes, the Montgomery T-tube does not have standard catheter mount connectors [6]. Therefore it is difficult to be connected to anesthesia circuit.

The loss of airflow and inhalant anesthetics through the open upper intraluminal limb of the T-tube after its insertion has been an important problem. The method of ventilation described by Montgomery following T-tube insertion requires occlusion of the upper intraluminal limb using a Fogarty catheter and insertion of an endotracheal tube into the extraluminal limb of the T-tube to establish a closed system with the distal tracheobronchial system and allow ventilation and anesthesia to continue through the external limb [1]. If an endotracheal tube exists in situ from mouth and can be advanced through the intraluminal vertical limb of the T-tube, ventilation can be recommenced through the tracheal tube [3]. An LMA can be used as a pathway of ventilation by occluding the extratracheal lumen of T-tube with the spigot [4] or employed as a means of upper airway occlusion while ventilation continues via the extratracheal portion [6]. Just a tight pharyngeal packing can prevent the leakage of inspired gas through upper end of
T-tube [7].

In this case, we did not perform orotracheal intubation because the stenosis was above the tracheostomy site and the intubation through the tracheostomy orifice was expected to be easy.

Montgomery’s technique of T-tube insertion can be more or less difficult in cases of a tracheal stenosis above the stoma or when dealing with a patient with a thick neck as in this case. Because ventilation is not possible during insertion, the procedure, if it is long, can become dangerous. Therefore we planned the insertion of T-tube after complete recovery of self-respiration because there was no residual surgical procedure after its insertion. However we sustained administration of volatile agents till extubation for sedation and analgesia during insertion of T-tube. This method may seem to be somewhat crude, but can guarantee safe airway control even if insertion of T-tube is delayed.

In conclusion, anesthesiologists dealing with diseases of the airways should be familiar with care of Montgomery T-tubes and discuss with the surgeons to avoid potential problems when sharing an airway.

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REFERENCES