

# TIVA-A Promising Approach to Anaesthetic Management of Montgomery T-tube Insertion

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## ABSTRACT

One of the treatment modalities for tracheal stenosis is tracheal dilatation and stenting using silicone Montgomery T-tube. Various techniques have been reported for this procedure. For safe anaesthetic management, anaesthesiologist must be aware of the surgical procedure, limitations of T-tube, likelihood of compromised airway besides the inherent problems of sharing the airway with surgeons. Total intravenous anaesthesia (TIVA) is a technique which has become very popular and possible now a days for various surgical procedures owing to its advantages. The anaesthetic technique should be based on the provider's experience and severity of tracheal stenosis. We present here the anaesthetic management using TIVA technique with propofol and atracurium for the insertion of Montgomery T-tube in a case of post intubation tracheal stenosis.

## CASE REPORT

A 21-year-old female with a silicon tracheostomy tube in situ, weighing 40 kg was scheduled for elective insertion of Montgomery tracheal T-tube under anaesthesia. She had a history of accidental drowning for which she had been artificially ventilated with an oral endotracheal tube for ten days. Prolonged intubation resulted in tracheal stenosis for which she had undergone tracheostomy on an emergency basis. On preoperative examination, she was otherwise fit and well without any significant medical history. She was given intravenous (IV) ranitidine 50 mg and metaclopramide 10 mg one hour prior to surgery. She was premedicated with midazolam 1 mg and 0.2 mg glycopyrrolate intravenously (IV) before induction of anaesthesia. After preoxygenation and institution of non invasive monitors like pulse oximetry, electrocardiography, non invasive blood pressure and end tidal carbon dioxide, anaesthesia was induced using IV propofol 2 mg/kg. Fentanyl 2 mcg/kg was used for analgesia and atracurium 0.5 mg/kg was given for muscle relaxation as well as to allow controlled ventilation. Anaesthesia was maintained using 100% oxygen with propofol infusion at a rate of 2mg/kg/hr. The oxygen was given through the tracheostomy tube in situ using Bain's circuit while the surgical dissection was being performed. Prior to the removal of tracheostomy tube, the muscle relaxation was reversed with IV neostigmine and glycopyrrolate. IV Propofol 30 mg and fentanyl 25 mcg were given. As soon as spontaneous breathing was attained, the tracheostomy tube was exchanged for a Montgomery T-tube. The external limb of the T-tube was connected to the Bain's circuit using a no 5.5 endotracheal tube (ETT) connector (cuffed). Bag movement was confirming spontaneous breathing, rate and its adequacy. After securing the T-tube. firmly in place, the propofol infusion was stopped and patient was awakened. Postoperatively the patient was shifted to Postoperative care unit wherein her vital parameters were stable. She was discharged on the sixth postoperative day with advice for regular ENT follow up.

## DISCUSSION

Introduced in 1965 to support trachea during laryngotracheal surgeries, the Montgomery T-tube is a silicone T-shaped tube that is placed with the long limb into the trachea and short limb protruding through the tracheostomy stoma. The size of the tube ranges from 4.5 to 6 mm external diameter. The purpose of the tube is to keep

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the tracheal lumen patent and to prevent mucosal ulceration from scarring [1].

The main advantage of the T-tube includes the preservation of normal respiration and phonation with minimal tissue reaction to the silicone material. The risk of its migration is virtually nil owing to an anchored external limb. It is well tolerated and stays in place for long time [2,3].

The need of a tracheostomy stoma and an unpleasant cosmetic appearance of a protruding neck tube are the main drawbacks of the T-tube. It is not suitable for positive pressure ventilation and in patients with risk of aspiration [2].

The problems encountered during insertion of the T-tube include-

- Misplacement of upper and lower limbs as the tube is soft.
- Providing controlled ventilation though it is difficult as upper limb of intratracheal portion is open leading to leakage of gases. Moreover the external limb does not fit into a standard connector [1].
- Anaesthesiologist cannot control the airway fully during the time of its insertion.
- It can kink at the junction of intratracheal and extra tracheal part during insertion [1].
- The open end of the intratracheal upper limb of the T-tube leads to gas dilution and inadequate anaesthetic depth [1,4].

Various ways of providing anaesthesia for T-tube insertion have been listed in literature. Montgomery suggested passing a Fogarty catheter through the extra tracheal lumen up to the upper stem of the T-tube and occluding the open end of the tube by inflating the catheter bulb with the ventilation done through a tracheal tube placed adjacent to the catheter [5]. Guha et al., advocated the insertion of LMA (laryngeal mask airway) before the insertion of the T-tube, later continued by ventilation through the LMA and by occluding the extra tracheal limb by a spigot [6]. Wouter et al., passed a microlaryngeal tube through the intracheal limb of the T-tube using awake fibre optic bronchoscopy in a patient of acute intestinal obstruction [7]. Uchiyama et al., succeeded in inserting LMA before insertion of the T-tube and ventilation was maintained through the extratracheal lumen occluding the upper end of the LMA [8]. The Hebelor T-tube is a modified tube containing an internal balloon in the proximal portion of the intraluminal upper limb. Ventilation of

distal airways can be achieved by transiently inflating the balloon [2]. TIVA technique in combination with superior laryngeal nerve block has been used for tracheal dilatation and stenting in few cases by some authors. It had the advantage of early recovery, lesser hypercapnia and desaturation compared to a general anaesthesia technique using muscle relaxation and inhalational agents [9].

Sanjay et al., achieved effective ventilation through extra tracheal lumen by occluding the upper lumen using pharyngeal pack [1]. Airway loss and leak around the pack can be a disadvantage in this method. Zia Arshad et al., reversed muscle paralysis and withdrew isoflurane before insertion of T-tube and maintained the patient on propofol infusion. They succeeded in ventilation by connecting Bain's circuit to the T-tube using ETT no 5.5 connector [3]. Kerai et al., opted for assisted spontaneous ventilation with 2% sevoflurane for direct laryngoscopy in a patient with T-tube in situ [4]. Samarjit et al., used dexmedetomidine along with adequate airway anaesthesia for an awake tracheal stenting under fluoroscopic guidance [10]. Jung Sun Park et al., have inserted a laryngeal mask airway under total intravenous anaesthesia using propofol and remifentanyl during the insertion of a Montgomery T-tube in a tracheal resection and thyrotracheal anastomosis secondary to severe subglottic stenosis [11].

However, we found no mention in the literature of T-tube insertion performed solely under TIVA using propofol and atracurium. We decided to maintain spontaneous breathing during the insertion of the T-tube as it provides a control over the airway and offers safety in case of airway obstruction if there is kinking of the tube at the junction of extra luminal and intraluminal limb and if the airway is lost during removal and T-tube re insertion. Though awareness and aspiration of gastric contents were a possibility in this method, we continued propofol infusion throughout to combat awareness. Moreover, the patient was nil by mouth for the past 8 hours with anti-aspiration prophylaxis having been given. The duration of surgery was less

after the insertion of T-tube thus spontaneous breathing was only for a short duration of time. We would like to highlight the fact that TIVA can be a good choice for a case of T-tube insertion. In our case the depth of anaesthesia which should be ideally monitored for TIVA could not be measured due to the non availability of equipment.

## CONCLUSION

Anaesthesiologists should know the pros and cons of different methods of anaesthesia and ventilation for Montgomery T-tube insertion. The TIVA technique which is of late gaining popularity would be an apt method of anaesthetising such challenging cases.

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