Case Report

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Airway management during Montgomery T– tube insertion– A case report

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Abstract:

The Montgomery tracheal tube (T tube) devised by Dr.William Montgomery in 1964 is used both as a tracheal stent and as an airway after laryngotracheoplasty. A tracheostomy opening is a prerequisite for insertion of the T tube. This device can present various challenges to the anaesthetists during it's placement including the potential for acute loss of the airway, inadequate administration of inhalational agents and inadequacy of controlled ventilation. In the present case, successful airway management was done using the extratracheal limb of the T tube for ventilating the lungs while the upper end was sealed by using a Laryngeal Mask Airway (LMA) whose end was blocked by an adaptor cap of the urobag.

Key words: Laryngeal mask airway (LMA); Montgomery T tube; Tracheostomy

Introduction

The Montgomery T tube is a device used as a combined tracheal stent and tracheostomy tube to prevent post-operative tracheal stenosis [1]. Introduced in 1964 this device is an uncuffed silicone T tube that is inserted with a long limb into the trachea and with a short limb protruding through the tracheostomy stoma during laryngotracheoplasty. Tracheal resection is indicated for carcinoma or stenosis due to trauma. End-to-end anastamosis is the treatment of choice but, depending on the portion of trachea involved, alternatives include buccal grafts, cartilage inserts, and local or regional flaps. Two major difficulties confront surgeons managing chronic stenoses of the airway: (a) maintaining the patency of the trachea, whose lumen tends to progressively narrow because of wound contraction, and (b) reconstructing an adequate airway without the need for a permanent tracheotomy tube and consequent loss of vocal function. Standard tracheal stents have been used to prevent scar contracture. Standard stents include an ETT, silastic sheet rolls, and laryngeal stents that can be solid or wound coils [2],[3] . A disadvantage of standard stents is the requirement for an alternative airway in the form of a tracheostomy [4].The Montgomery tracheal T-tube has the advantage of being both a stent and tracheotomy tube.

Only very few anaesthesiologists are familiar with this device. Anaesthetists may experience problems like air dilution, hypoventilation and patient awareness during anaesthesia for T tube insertion [5].The present case report describes a case of successful airway management using tracheostomy tube for ventilation to start with and changed over to Montgomery T tube for a patient who underwent cricoid cartilage reconstruction with rib graft followed by neck flap cover. The patient was reversed with T tube in-situ allowing normal respiration, normal phonation and normal humidification of inspired gases.

Case Report:

Thirty six year old gentleman with tracheostomy tube in-situ was assessed under ASA2 (Type II Diabetes mellitus) and posted for cricoid cartilage reconstruction with rib graft, neck flap cover and Montgomery T tube insertion. This patient was having longstanding tracheostomy (9 months duration) following failure of subglottic stenosis resection and primary anastamosis.

After intravenous induction with Injection Propofol 100 mg and Injection Morphine 6 mg, anaesthetic circuit was connected to the Portex tracheostomy tube (8 sized cuffed). After confirming the

position of the tracheostomy tube, the patient was paralysed with Injection Vecuronium 8 mg IV. Maintenance of anaesthesia was done with N2O (4 Lit / min), O2 (2 Lit /min) and Sevoflurane (0.6 to 2%) via the tracheostomy tube.

After harvesting the rib graft for cricoid cartilage reconstruction, a size 4 LMA was inserted, cuff inflated with 40 ml of air and it's open end was blocked by the adaptor cap of the urobag and fixed in position. Granulation tissue around the tracheostomy stoma was shaved off to remove the tracheostomy tube. After removal of the tracheostomy tube, a 7 mm reinforced endotracheal tube was introduced through the tracheostomy stoma. Anaesthetic gases were delivered via the ET tube during which further dissection of the tracheostomy bed was done. Then patient was oxygenated with 100% O2 for five minutes. ET tube was removed and Montgomery T tube (12 mm external diameter) was inserted. After a period of apnoeic oxygenation, anaesthetic circuit was connected to the extra tracheal limb of the T tube with the help of a 7 sized ET tube connector. Leakage of gases through the upper end of the intra tracheal part was blocked by the LMA in place. Cricoid cartilage reconstruction with rib graft was done followed by neck flap cover. Intraoperatively patient was haemodynamically stable with no hypoxic episodes. At the end of the procedure, patient was reversed with Injection Neostigmine 3 mg and Injection Glycopyrrolate 0.4 mg IV. After spontaneous respiratory attempts and when the patient was fully awake LMA was removed. Patient was shifted to the postoperative ward with spontaneous breathing via Montgomery T tube. The patient could thus breathe through both parts of the T tube.

Discussion

Montgomery T tube is a silicone tube developed and originally described by Dr.William Montgomery and used for stenting the airway after repair of stenosis in the low subglottic region [6].This T tube is composed of a short laryngeal part, a long tracheal part, an extra tracheal part and a spigot [7].This uncuffed silicone T tube has lesser tissue reaction and thus allows little adherence for mucus and crusts. It is inserted with the long limb into the trachea and the short limb protruding through the tracheostomy stoma. The junctions of the intraluminal and extraluminal limbs are angled obliquely to promote suctioning of respiratory secretions. Intratracheal parts (long limb) the ends are tapered to minimize injury to the tracheal mucosa. The proximal portion of the intraluminal limb is shorter than the distal portion and it terminates under the vocal cords. Extra long distal portion of the intraluminal limb stents the distal trachea. Extra tracheal or extra luminal short limb portion has a lumen with a friction held plug. A tracheostomy opening is a prerequisite for insertion of the T tube.

The T tube is available in sizes ranging from 4.5 to 16 mm external diameter. The diameter of the T tube is calculated based on computed tomography (CT) – external (3D reconstruction), internal (virtual bronchoscopy) and by direct bronchoscopic visualisation. The ideal length of T tube is assessed by careful bronchoscopic measurements of distance between the vocal cords and tracheostomy stoma and the length of the tracheal lesion distal to the tracheostomy stoma.

The main indications of it's use are post laryngotracheoplasty (to keep the lumen patent and to prevent mucosal laceration from scarring), tracheomalacia, relapsing polychondritis, post tubercular bronchostenosis, amyloidosis, tracheobronchial trauma, post anastamotic bronchial stenosis and extrinsic airway compression. In contrast to a tracheostomy tube, the T tube has the advantages of preservation of the voice and normal respiration and minimal generation of cough. It avoids mucosal abrasion and the formation of granulation tissue associated with the maintenance of a tracheostomy tube [1,8].It does not harden with prolonged contact with body temperature and secretions [9].

The main contraindication is prolonged mechanical ventilation requiring PEEP and risk of aspiration (proximal limb extending above the vocal cords prevent complete glottic closure and increases the risk of aspiration).

The Montgomery T tube suffers from the disadvantage of not accommodating a standard catheter mount connector. The attending anaesthesiologist should seek ways of delivering volatile agent and carrier gases [10].Due to the variable internal diameter and thickness of the tube itself, it can be difficult to predict the size of a standard 15 mm tracheal tube connector that will fit the extratracheal portion of the Montgomery T tube. Therefore, a range of connectors should be available to liase with the surgical team to obtain prior information regarding the approximate size of the Montgomery tube that they wish to use.

In this case we used 12 mm external diameter Montgomery T tube and a 7 sized ET tube connector for the extratracheal portion to connect the breathing circuit. Maintenance of anaesthesia was done through the extratracheal portion of the T tube. We blocked the leakage of gases through the upper end by a 4 sized

LMA in place, cuff inflated and the free end closed by the adaptor of a urobag [10].We did not opt to ventilate through the LMA because this might cause significant gas leaks in the surgical site disturbing the surgeon. A sterile catheter mount was used to connect the anaesthetic circuit. This method was felt easy, atraumatic, familiar to the anaesthetist and also enabled the surgeon to operate uninterruptedly in a leak free surgical field. The LMA mediated use of a fibreoptic bronchoscope can accurately localize the glottis and confirm the correct position of the Montgomery T tube [11].

There are other ways to maintain breathing after T tube insertion. (a) A Fogarty embolectomy catheter can be passed through the short laryngeal part to obstruct the upper intraluminal limb of the T tube followed by insertion of the endotracheal tube into the extratracheal portion [9].The flow of gas is then delivered through the ET tube in the distal airway [1].This procedure is complex and hence was not used in this case. (b) Maintaining ventilation via the extratracheal part of the T tube, after the occlusion of the top of the LMA [10].This method was adopted in our case. (c) Third method is jet ventilation. In this method, the attending anaesthetist positions the tip of a jet catheter into the short laryngeal portion to maintain ventilation.(d) The fourth method is use of Bain's breathing system, in which a Y connector is connected at the end of the circuit, and fresh gas flow is delivered to the extratracheal part of the T tube and the face mask. This method carries the risk of aspiration [10].

Ventilation during insertion of Montgomery T tube is maintained through apnoeic oxygenation by preoxygenating with 100% O2 for 5 minutes. If the procedure is to be completed with insertion of tube alone, the patient can be reversed and maintained on spontaneous breathing during insertion of Montgomery T tube. But in our case, the patient required neck flap cover and hence anaesthesia was maintained through the T tube itself.

There were only a few reports about the anaesthetic management of patients who need Montgomery tube insertion [12,13].

Summary

As these patients are unlikely to present frequently, an anaesthetist who is not familiar with the Montgomery T tube may be faced with difficulties.Although not the panacea for airway problems, the laryngeal mask airway should be given thoughtful consideration and should always be at hand when dealing with difficult or potentially difficult airways.Anaesthetists involved in airway surgery should communicate early with the otolaryngologists to discuss the planned sequence of events. Always attempt to visualize any tracheal stents to be used operatively so that contingency plans can be prepared to cover most eventualities.We also strongly suggest detailed discussions with the surgical team to avoid potential problems when dealing with a shared airway.

References

1. Wahidi MM, Ernst A. The Montgomery T-tube tracheal stent. Clin Chest Med. 2003;24:437–443.

2. Schuller DE. Long-term stenting for laryngotracheal stenosis. Ann Otol Rhinol Laryngol 1980;89:515-20.

3. Zalzal GH. Use of stents in laryngotracheal reconstruction in children: indications, technical considerations, and complications. Laryngoscope 1988;98:849-54.

4. Montgomery WW, Montgomery SK. Manual for use of Montgomery laryngeal, tracheal and esophageal prostheses: update 1990. Ann Otol Rhinol Laryngol 1990 (Suppl 150);99:2-9.

5. Kulkarni VR, Kelkar VS, Salunkhe SA. Anaesthetic challenges of the Montgomery T-tube insertion in a patient with fascioscapulohumeral dystrophy. Indian J Anaesth. 2005;49:502–504.

6. Cooper JD, Todd TR, Ilves R, Pearson FG. Use of the silicone tracheal T-tube for the management of complex tracheal injuries. J Thorac Cardiovasc Surg. 1981;82:559–568.

7. Choi BR, Chung JY, Yi JW, Lee BJ, Kim DO, Kang JM. The use of the Montgomery T-tube in postprocedural subglottic stenosis repair. Korean J Anesthesiol. 2009;56:446–448.

8. Liu YH, Wu YC, Hsieh MJ, Ko PJ, Liu HP, Lin PJ. Montgomery T-tube insertion using a rigid bronchoscope under direct observation. ANZ J Surg. 2006;76:853–854.

9. Montgomery WW. Manual for care of the Montgomery silicone tracheal T-tube. Ann Otol Rhinol Laryngol Suppl. 1980;89:1–8.

10. Guha A, Mostafa SM, Kendall JB. The Montgomery T-tube: anaesthetic problems and solutions. Br J Anaesth. 2001;87:787–790.

11. Tanigawa N, Sawada S, Okuda Y, Sougawa M, Komemushi A, Kojima M, et al. Expandable metallic stent placement in upper tracheal stenosis: value of laryngeal masks. AJR Am J Roentgenol. 2001;177:1423–1426.

12. Mather C M, Sinclair R, Gurr P. Tracheal stents: the Montgomery T-tube. Anesth Analg 1993; 77: 1282–4

13. Sichel J-Y, Eliashar R, Dano I, Braverman I. Insertion of a Montgomery T-tube. Laryngoscope 1998; 108: 1107–8

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