Minitracheostomy in elective surgery of the larynx: an alternative to formal tracheostomy

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A patient scheduled for surgical removal of a giant polyp of the larynx, and in whom difficult orotracheal intubation was anticipated in the preoperative visit, was managed successfully with a minitracheostomy performed with a Mini-Trach II kit. The ventilation achieved was adequate throughout the procedure. Thus, conventional tracheostomy was avoided.

Nous décrivons l'application du système "Mini-Trach II" pour le maintien de la voie aérienne et de la ventilation mécanique chez un patient avec un polype géant à sa corde vocale droite, qui lui bouchait son larynx et rendait impossible l'insertion d'une sonde endotrachéale. De cette façon, on réussit à maintenir une ventilation appropriée en permettant la chirurgie proposée, sans avoir recours à une trachéostomie conventionnelle.

The Mini-Trach Kit (Portex U.K. Ltd) was first introduced in 1983 as an alternative method of suctioning bronchial secretions in the absence of tracheal intubation or conventional tracheostomy.¹⁻⁴ Also, it has been used to provide emergency access to the airway in difficult or failed intubation patients.

We describe a case in which coniotomy performed with the Mini-Trach kit avoided formal tracheostomy during elective surgery of the larynx.

Case report

A 36-yr-old male patient, weighing 75 kg, with a history

Key words

AIRWAY: management;
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FIGURE Glottic area showing a giant polyp in the right vocal cord.

of chronic hepatic disease of unknown aetiology and a heavy smoker, presented to the hospital complaining of disphonia. Indirect laryngoscopy showed a giant polyp in the right vocal cord, occupying almost all the glottic area (Figure). As a difficult intubation was anticipated, it was initially considered that a conventional tracheostomy would be necessary under local anaesthesia followed by surgical removal of the polyp under general anaesthesia. However, in order to avoid the formal tracheostomy which would be unnecessary after the removal of the polyp, we decided to perform a minitracheostomy (coniotomy), using a commercially available minitracheostomy pack (Mini-Trach II kit – Portex Ltd) and, if adequate ventilation could be achieved through the coniotomy, then the surgical removal of the polyp would be carried out.

The patient received premedication with diazepam 10 mg and fentanyl 0.1 iv. Monitoring included continuous ECG, and invasive arterial blood pressure with an indwelling catheter in the left radial artery. Arterial blood gas analysis (ABG) was measured every ten minutes during the operative procedure. Also, continuous transcutaneous oxygen tension was measured (Pulsimate Collin BX-5). Minitracheostomy was carried out under local

anaesthesia with 2.5 ml mepivacaine 1%, using the Mini-Trach II kit, which provided a flanged tracheal cannula of 4.0 mm ID and a 15 mm connector, which was connected with an integrated flexible tube (Engström-Edith Ltd) to the ventilator. Ventilation with oxygen was applied with a volumetric SERVO 900-B ventilator, at a rate of 14 bpm, and a minute volume of $15 \text{ L} \cdot \text{min}^{-1}$. Arterial blood gas analysis ten minutes later showed: PO_2 : 250 mmHg; PCO_2 : 41 mmHg; pH: 7.44; bicarbonate: 23.8; base excess: -0.9 .

As the ventilation achieved was satisfactory, the patient was anaesthetized with flunitrazepam 1.2 mg and fentanyl 0.2 mg *iv*, and muscle relaxation was attained with atracurium 30 mg *iv*. The surgical removal of the polyp was uneventful. As the polyp was removed, the Mini-Trach tube was replaced with an orotracheal tube (Portex), 6.5 ID, which was placed easily. Ventilation was then continued using a minute volume of $9 \text{ L} \cdot \text{min}^{-1}$ and an oxygen-air FiO_2 0.4%. Following reversal of neuromuscular blockade with atropine 1 mg and neostigmine 2 mg *iv*, the trachea was extubated after hydrocortisone 100 mg *iv* was given.

During the 30 min of surgery, transcutaneous oxygen saturation remained above 98%. Arterial blood gas analysis performed every ten minutes showed PaO_2 values between 180 and 250 mmHg, and PaCO_2 between 39 and 42 mmHg. The haemodynamic and ventilatory status was uneventful.

The patient was taken to the recovery room and eight hours later was discharged to the ward. He left the hospital two days later, and eight days after his discharge from the hospital the site of the coniotomy had closed.

Discussion

Coniotomy is an alternative means of establishing rapid access to the airway in patients in whom orotracheal intubation has failed.^{1,2,5-11} The method can maintain oxygenation until a definitive airway can be established. This avoids conventional emergency tracheostomy which usually takes longer and has a higher frequency of complications.

The Mini-Trach Kit (Portex Ltd) was first introduced in 1983 for suctioning bronchial secretions and its success for this has been well documented.^{1,3,4} Also, it has been used to provide rapid, simple access to the airway after difficult or failed tracheal intubation. Likewise, it can be used as an alternative to conventional tracheostomy in patients with obstructive sleep apnoea.¹²

This case describes an elective operation in which a minitracheostomy performed with the Mini-Trach II pack avoided formal tracheostomy. Adequate ventilation was maintained throughout the operative procedure, as demonstrated clinically and by blood gas analysis. As the giant

polyp was removed, the difficulty in intubating the trachea was eliminated so intubation was performed without problems.

Before surgery, three conditions were considered to be essential:

- 1 Coniotomy should fulfil the requirements for adequate ventilation throughout the procedure.
- 2 If coniotomy failed to provide adequate ventilation, emergency formal tracheostomy should be available.
- 3 As the Mini-Trach tube does not have a cuff, the surgical procedure should be non-haemorrhagic.

All three conditions were present. The high minute volume compensated for air leaks during the IPPV.

Using a minute volume of $15 \text{ L} \cdot \text{min}^{-1}$ (approximately 40% higher than expected for the patient's weight), a PaO_2 of $302 \pm 50 \text{ mmHg}$ ($\bar{x} \pm \text{SD}$) and a PaCO_2 of $37 \pm 4 \text{ mmHg}$ were achieved. Coniotomy is not free from complications: haemorrhage,^{13,14} pneumothorax,¹⁵ subcutaneous emphysema,¹⁶ oesophageal perforation¹⁷ and intraoesophageal placement of cannula¹⁸ are among the most frequent complications described. There are no references to laryngeal stenosis associated with a mini-tracheostomy when the cannula is placed for only a few hours; and in our case, it did not occur. However, the incidence of complications related to coniotomy is low compared with that of conventional tracheostomy.

Compared with other methods of performing the coniotomy (Tuohy needle, teflon cannula, etc.)^{8,10} with which adequate ventilation is more difficult to attain, the Portex Mini-Trach II kit permits safe, simple, and quick access to the airway.

In conclusion, we believe that coniotomy performed with the "Minitrach" cannula can be a useful alternative to conventional tracheostomy in elective surgical procedures of the upper airway in which difficult intubation is anticipated.

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