

Use of the Carden anaesthetic tube for surgery around a tracheostome

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Abstract

This short communication describes the use of the Carden anaesthetic tube during surgery in and around a tracheostome. The technique, which greatly facilitates access to the operating field, is described along with its indications and contraindications.

We would like to recommend extending the use of the Carden tube to operations around a tracheostome, thereby maximizing surgical access.

Key words: Intubation, intratracheal; Tracheo-oesophageal fistula; Larynx, artificial

Introduction

The use of the Carden anaesthetic tube has become a widely accepted technique, to facilitate microlaryngeal surgery, since its introduction in 1974 (Carden *et al.*, 1974). The tube consists of a silicone elastomer cuffed endotracheal tube, 6.25 cm long, with an attached inflating tube and a built-in jet tube (Figures 1 and 2) through which the patients lungs are ventilated by jetting oxygen. The built-in jet tube eliminates the Venturi effect in the operating field thus blowing air outwards during both inflation and exhalation and minimizing the risk of blood and debris being blown into the lungs. The jet ventilation requires connection to pipeline oxygen, a pressure valve and a blowgun button.

When used for microlaryngeal surgery the width of the tubes in the operating field are 1.5 mm (the cuff inflating tube) and 3.5 mm (the jet tube) thus providing minimal obstruction to the field of view.

Surgical techniques using the Carden anaesthetic tube

The creation of a tracheo-oesophageal fistula

Although reports vary, up to 50 per cent of laryngectomy patients fail to achieve reasonable oesophageal speech (Goode, 1974; Snidecor, 1975) and the management of such patients is the common problem encountered by ENT surgeons. A number of techniques have been developed to improve voice rehabilitation and these include the creation of a tracheo-oesophageal fistula for the insertion of various types of artificial voice prostheses. These include the Blom-Singer (Singer and Blom, 1980), Panje (1981), and Groningen (Manni *et al.*, 1986) prostheses as well as the more recently introduced low-resistance, self-retaining voice prosthesis ('Provox') first described by Hilgers and Schouwenburg (1990). All these devices require the surgical fashioning of a tracheo-oesophageal fistula and whilst this may be done as a primary procedure at the time of laryngectomy (Yoshida *et al.*, 1989) it is more often carried out three to six months later. Although possible under local anaesthetic a general anaesthetic is often felt to be preferable.

Changing of a voice prosthesis

The replacement of the Groningen and Provox voice pros-

theses should be carried out by a surgeon and is described as an out-patient procedure which can usually be undertaken using local anaesthesia (Parker and Clegg, 1993). In the case of the Provox valve the mean device life is approximately five months and may be considerably shorter than requiring regular changes of the prosthesis. In certain circumstances, mentioned in the original articles and detailed in Table I, a general anaesthetic may be indicated to carry this out. In such circumstances the use of the Carden endotracheal tube greatly facilitates access to the operating field whilst maintaining control of ventilation for the anaesthetist.

Surgical refashioning of a tracheostome

Occasionally a laryngectomee may experience airway management problems due to stricture or stenosis of their tracheostome and upper trachea. If nonsurgical measures fail to resolve the problem then the tracheostome and upper trachea may have to be refashioned. The Carden tube is a useful adjunct to surgery in most instances, however it should be noted that with a severely

TABLE I

INDICATIONS FOR GENERAL ANAESTHESIA DURING PROSTHETIC VALVE REPLACEMENT

- (1) Patient preference for general anaesthesia.
- (2) Associated dysphagia where serious stenosis is suspected and pharyngo-oesophageal dilatation will be required.
- (3) The patient is undergoing a concomitant surgical procedure requiring a general anaesthetic.

TABLE II

CONTRAINDICATIONS TO THE USE OF THE CARDEN TUBE WITH JET VENTILATION

- (1) Severe chronic obstructive airways disease.
- (2) Obese patients.
- (3) Extensive tracheal stenosis.
- (4) Bleeding above the tube.

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Accepted for publication: 15 July 1993.

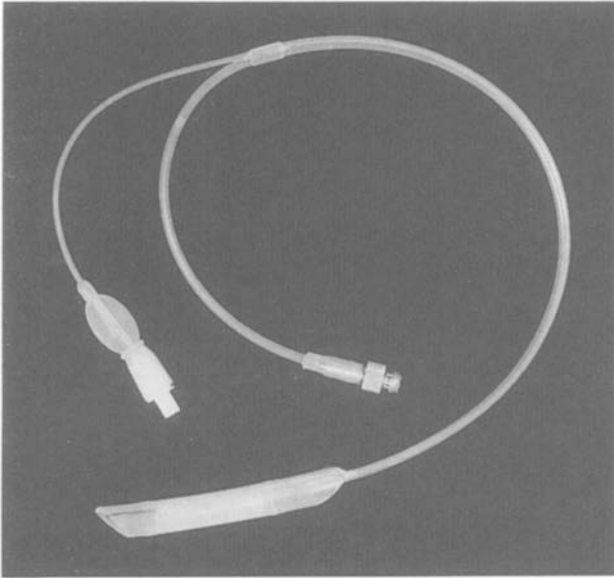


FIG. 1
The Carden endotracheal anaesthetic tube.

narrowed trachea it may prove impossible to pass the smallest Carden tube (size 6) beyond the obstruction. Other contraindications to the use of the Carden tube with jet ventilation are outlined in Table II.

The patient is pre-oxygenated for approximately four minutes via a face mask held against the tracheostome (Figure 3). After induction of anaesthesia and muscle paralysis the Carden tube is introduced into the trachea using a Magills or other packing forceps. The cuff is inflated to hold it in position and the jet tube attached to the jetting apparatus and ventilation begun. Anaesthesia and paralysis are maintained using intravenous agents and surgery may now commence.

For the placement of a prosthetic valve for voice rehabilitation following laryngectomy the optimum site for the creation of a tracheo-oesophageal fistula is approximately 10 mm from the mucocutaneous junction on the anterior margin of the tracheostome. When a Blom-Singer valve is to be used then this distance is slightly less. The anaesthetic technique described here provides the surgeon with excellent access to the operating site

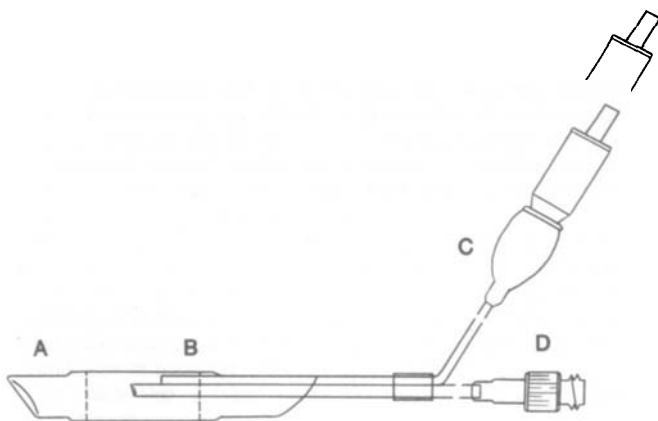


FIG. 2
Diagram of the Carden anaesthetic tube. A, endotracheal tube; B, cuff; C, inflating tube; D, jet ventilation tube.



FIG. 3
Pre-oxygenation via the tracheostome.

to either create a fistula or change a prosthetic valve (Figure 4). The techniques used for these procedures have been well documented in the literature.

Summary

The use of a Carden endotracheal anaesthetic tube with jet ventilation improves surgical access to the upper part of the trachea and tracheostome following laryngectomy. This greatly facilitates any surgical procedure in this region, in particular the creation of a tracheo-oesophageal fistula, the changing of various prosthetic valves and the refashioning of a tracheostome.

Acknowledgement

Thanks are due to the Medical Illustration Department, at York District Hospital, for their help in preparing the Figures.

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FIG. 4
Carden tube *in situ* illustrating excellent surgical access to the tracheostome (with Provox valve in position).

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