# Airway Management Following Tracheal Surgery

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**KEYWORDS**

• Trachea • Ventilation • Bronchoscopy • Respiratory failure • "T" tube

**KEY POINTS**

- Prophylactic measures and careful monitoring of the patient in the early postoperative period may help prevent the onset of respiratory failure following resections of the airway.
- Bronchoscopic monitoring of the airway to assess anastomotic healing, secretion retention, and "T"-tube position is extremely important.
- The intubation of the patient following tracheal surgery is best achieved with the assistance of a bronchoscope, and the technique used will depend on the presence or absence of a "T" tube and the level of the anastomosis.
- There are a variety of techniques for ventilating the patient depending on pulmonary compliance, the presence of a "T" tube, and the ability to secure a leak-free system.

## INTRODUCTION

Griff Pearson was a master surgeon, and it was the author's privilege not only to be one of his trainees but also to practice as his partner for 22 years. During that time it became clear that, although he was passionate about all forms of Thoracic Surgery, surgery of the trachea held a special place in his heart. As a Thoracic Surgeon but also critical care specialist, the author found this cadre of patients was especially interesting and presented opportunities to learn much about the management of the difficult airway.

What follows is the result of the experience gained during that time period and as a result represents the author's personal experience. Indeed, there is very little literature available on the subject of airway management once either airway compromise or respiratory failure ensues following tracheal resection. The author's and Dr Pearson's relatively large experience in tracheal surgery at Toronto General Hospital (now University Health Network) allowed them to experience most of the airway complications that can ensue following this highly specialized surgery. As such, they learned from trial and error what seemed to be the most successful solution to difficulties as they arose. As Hermes Grillo and colleagues[1] noted in their 1986 summary of a lifetime of experience, the results their patients experienced in the latter half of this large tracheal practice were superior to that noted in the first cohorts of patients.[1]

## IN THE OPERATING ROOM

The postoperative management of the airway begins in the operating room. Tracheal surgeons agree that it is optimal if extubation is performed in the operating room at the end of the procedure. A high success rate for early extubation depends on several factors, not the least of which is close communication between the surgeon and anesthetist. In particular, once the airway is closed with a completed anastomosis, the anesthetist

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needs to begin reversal of anesthesia to ensure that the patient is breathing spontaneously once the procedure has concluded. At the same time, however, sedation must be sufficient to avoid the patient excessively struggling against the tube. Prevention of excessive struggling will be particularly important during routine bronchoscopy, as is noted in later discussion.

The procedure ends with the application of the "chin stitch," a heavy suture applied in the submental groove and the manubrial-sternal junction in order to keep the neck in exaggerated flexion, hence decreasing anastomotic tension. The author's practice was always to have the anesthetist provide 10 to 15 mL of 2% lidocaine down the endotracheal tube as the chin stitch was being completed. This dose of lidocaine provides sufficient local anesthetic to the airway to permit the routine flexible bronchoscopic evaluation of the airway, which is undertaken before attempted extubation without the patient coughing or bucking during the procedure.

Flexible bronchoscopy through the endotracheal tube is an important adjunct to postoperative airway management. It permits the surgeon to evaluate the anastomosis for patency. In addition, it facilitates a thorough clearing of airway secretions, which along with blood will likely have accumulated throughout the resection. In addition, it is not infrequent, especially with cricoid and long segmental resections for a silicone T tube to have been inserted at the conclusion of the anastomosis.[2] Bronchoscopic assessment to ensure the tube is not kinked or twisted is essential. Bronchoscopy also provides the best assessment of the T-tube (Boston Medical Products, Westborough, MA) position relative to the vocal cords, the anastomosis, and the tracheal carina. Many surgeons will undertake such a bronchoscopic assessment of the T tube immediately following its insertion and before closure of the incision. On occasion, the tube will require readjustment based on this evaluation. It was the author's practice to assess the T-tube position after its insertion and undertake a thorough cleaning of the distal airway at that time. In addition, the author found it important to repeat the procedure once the chin stitch had been applied and as the endotracheal tube was being removed. This second bronchoscopy permitted a further assessment of pooled secretions and blood in the airway but also the opportunity to ensure that the T tube was not kinked from cervical flexion as well as to assess the vocal cords as the endotracheal tube exited the airway. The latter assessment is particularly important following subglottic resections involving removal of the posterior cricoid plate because considerable glottic edema may already be present.

There may be occasions when extubation in the operating room is not feasible. Such may be secondary to an inadequate reversal of anesthesia and thus poor respiratory effort. Glottic edema and retained secretions may also not permit extubation. Under such circumstances, the author would agree with Auchincloss and Wright[3] that it is best to place a small (6.5–7.0 mm) uncuffed endotracheal tube beyond the anastomosis. Such is best inserted under flexible bronchoscopic guidance to avoid trauma to the fresh tracheal suture line (see later discussion for technical considerations). The author prefers a nasotracheal tube under such circumstances when the neck is in hyperflexion because the ability to adequately view the glottis and angle the endotracheal tube through the cords is enhanced. Following laryngotracheal resection, D'Andrilli and colleagues[4] routinely leave such a nasotracheal tube in place for 24 hours; this permits them to extubate after another airway suctioning with the patient fully awake and breathing spontaneously, although such has not been the practice in Toronto. Should a nasotracheal tube be left in place for 24 hours or more, it is best for the patient to be returned to the operating room for endotracheal tube removal with anesthesia present so that all options are available should any difficulty with the airway be encountered.

## IN THE INTENSIVE CARE UNIT/STEP-DOWN UNIT

### *Observation and Monitoring*

As the heading suggests, the first few days following tracheal reconstruction are best managed in a specialized unit where expertise in airway management can be provided. Familiarity of the staff, especially nursing and physiotherapy, is essential in order to prevent airway compromise in those first postoperative days. Glottic and subglottic edema can be problematic, especially if the subglottic area has been transgressed or if a laryngeal release was required to reduce anastomotic tension. One can usually anticipate that the swelling will plateau at 72 hours. Airway secretions will be excessive for several days, and the patient's ability to adequately clear the airway will be compromised. Not only will secretions be increased, but there is also a reasonable chance that there will be retained blood and fluid in the distal airway despite the efforts of bronchoscopy in the immediate postoperative period. Glottic edema, postoperative pain, and the hyper neck flexion required in the more major resections to avoid anastomotic tension all conspire to reduce the patient's ability to cough and clear the airway of secretions.