



## Paediatric tracheostomy—An 11 year experience at a Scottish paediatric tertiary referral centre



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### ABSTRACT

**Aims:** The aim of this paper was to review the indications, complications and outcomes for tracheostomy at a Scottish paediatric tertiary referral hospital.

**Methods:** All patients undergoing tracheostomy between January 2001 and September 2012 were identified. A retrospective case note analysis was performed.

**Results:** 111 tracheostomies were done in the study period. The mean number per year was 11 (3–12). Full data was available for 95 patients. There were 56 (59%) males and 39 (41%) females. Age at time of tracheostomy ranged from one day to 15 years, the mean age of tracheostomy insertion was 69 weeks. The majority of patients, 75 (79%), were under one year old when they had their tracheostomy. The most common indication was long-term ventilation (20%), followed by craniofacial abnormality causing airway obstruction (18%), followed by subglottic stenosis (14%). 37% of patients were decannulated.

**Conclusions:** This series reflects current trends in the indications for paediatric tracheostomy, with chronic lung disease of prematurity being the most common indication.

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## 1. Introduction

Tracheostomy is a life saving operation, however, it is associated with potential serious complications. Recent publications suggest that the indications for tracheostomy in children have been changing considerably over recent years, in comparison to the adult population where indications have remained the same. Life threatening infections, such as diphtheria, were historically the main indication for paediatric tracheostomy [1]. However with the introduction of modern immunizations, life-threatening infections are now less common, and subsequently the need for tracheostomy. Advances in neonatal medicine now allow children to stay on long-term ventilator support for many weeks to months. Tracheostomies help facilitate pulmonary toilet in such patients, and reduce chronic laryngotracheal lesions related to long term intubation, such as subglottic stenosis [2] Paediatric tracheostomy is technically more demanding than one performed on an adult, due to the size of the patient and the limited extent of the operating field. Paediatric patients have a higher reported mortality,

morbidity and complication rate, particularly in pre-term infants, compared to the adult population [3,4]. The aim of this paper was to review our 11 year experience of tracheostomies and compare it to the airway workload in our department.

## 2. Materials and methods

A retrospective review of all tracheostomies performed at the Royal Hospital of Sick Children between January 2001 and 1st September 2012 was carried out. The Royal Hospital for Sick Children, Glasgow, serves a population of around 1 million people, as well as being the tertiary referral centre in Scotland for paediatric airway services. Patient case notes were analysed with respect to the following variables: age, demographics, indication for procedure, co-morbidities, length of stay, decannulation, trachea-cutaneous fistula closure, and complications experienced. ENT surgeons carry out all tracheostomies performed in the hospital. All tracheostomies were performed under general anaesthetic. A standard tracheostomy procedure is used, with a horizontal skin incision. Once trachea is visible, a vertical incision is made in the trachea, and two parallel stay sutures are placed on either side of the incision. Stomal maturation sutures are placed from trachea to skin, which became routine practice in 2010. The

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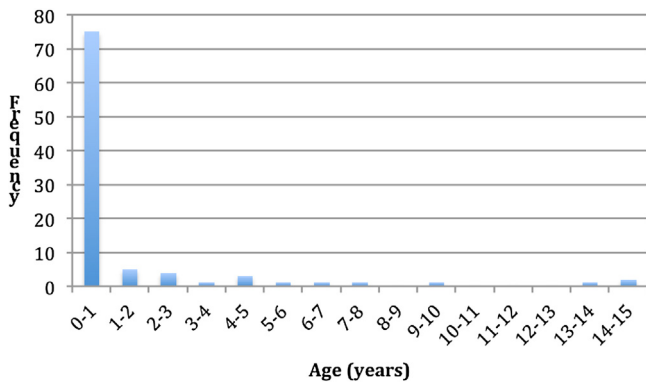


Fig. 1. Age distribution of patients.

tracheostomy tube is placed. All patients were admitted to the paediatric intensive care unit post operatively. Tracheostomy tubes were changed bedside 2–3 days after the operation.

3. Results

3.1. Patient demographics

One hundred and eleven patients underwent a tracheostomy over an 11-year period, with notes available for 95 patients. All tracheostomies were performed by ENT surgeons (consultants or surgeons in training with consultant supervision). There were 56 (59%) males and 39 (41%) females. Age at time of tracheostomy ranged from one day to 15 years, the mean age of tracheostomy insertion was 69 weeks. The majority of patients, 75 (79%), were under one year old when they had their tracheostomy performed, see Fig. 1, with the majority of these patients being under 5 months of age, see Fig. 2. The mean weight at time of tracheostomy was 6.9 kg (1.57–60 kg).

3.2. Preoperative ventilation status

Fifty two patients (55%) were intubated prior to the tracheostomy insertion, 43 patients (45%) were not intubated prior to tracheostomy insertion. The mean length of intubation prior to tracheostomy was 6 days (1–26). 84 (88%) patients had their procedure performed as an elective case, 11 (12%) had their tracheostomy performed as an emergency.

3.3. Indications

Indications for the tracheostomy insertion are shown in Table 1. The most common indication was long-term ventilation (20%), followed by craniofacial abnormality causing airway obstruction (18%), followed by subglottic stenosis (14%).

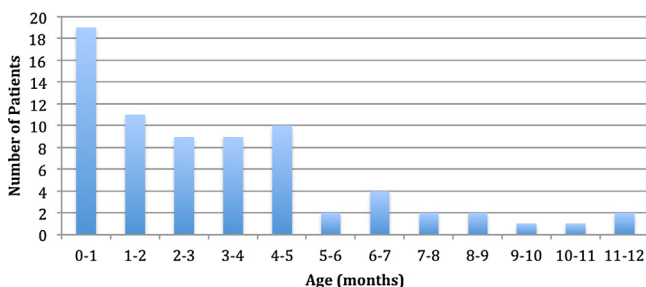


Fig. 2. Number of patients under 12 months of age.

Table 1 Indications for tracheostomy.

Indication	Number of patients (%)
Acute neurological insult	2 (2)
Laryngomalacia	2 (2)
Cardiac patient for weaning	2 (2)
Bilateral vocal cord palsy	10 (11)
Long term ventilation	30 (32)
• Tracheobronchomalacia	
• Chronic neurodevelopmental disorder	
• Congenital hypoventilation syndrome	
• Diaphragmatic hernia	
• Cardiac/right phrenic nerve palsy	
Chronic lung disease of prematurity	7 (7)
Recurrent difficult intubation	1 (1)
Chronic neurological disorder	2 (2)
Obstructive sleep apnoea	1 (1)
Craniofacial abnormality causing upper airway obstruction	17 (18)
Macroglossia causing airway obstruction	1 (1)
Neck mass causing airway obstruction	2 (2)
Subglottic stenosis	13 (14)
Other	5 (5)

3.4. Complications

Complications were divided into early post operative and late postoperative, see Table 2. Early postoperative complications included one pneumothorax, 5 patients with bleeding from their stoma and 5 episodes of tube displacement requiring emergency tube change. Only granulation tissue requiring excision was included as a postoperative complication, almost all patients developed mild stomal granulation which was treated with topical steroid cream and/or topical silver nitrate cautery.

3.5. Length of stay and decannulation

The mean length of stay for admission during which the tracheostomy was performed was 18 weeks (1–91). Thirty-five (37%) of patients went on to have decannulation of their tracheostomy tube. The mean duration of tracheostomy prior to decannulation was 28 months (1–132). Twenty-seven (77%) of the 35 decannulated patients underwent a routine microlaryngoscopy and bronchoscopy (MLB) prior to decannulation. 9 (33%) of the 27 patients who underwent MLB prior to decannulation were found to have suprastomal granulation tissue and 3 patients were found to have new subglottic stenosis.

3.6. Number of tracheostomies and MLBs

The mean number of tracheostomies performed each year is 9 (3–12), with the numbers remaining relatively stable over the study period, Fig. 3. In comparison, there has been a steady increase in the number of microlaryngoscopy and bronchoscopies done each year, Fig. 4.

Table 2 Tracheostomy complications.

Complication	Number of patients (%)
Early post operative	5 (5)
- Bleeding	1 (1)
- Pneumothorax	5 (5)
- Tube displacement	
Late post operative	13 (14)
- Wound infection	9 (9)
- Granulation tissue requiring intervention	3 (3)
- Subglottic stenosis	19 (20)
- Tracheocutaneous fistula	

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