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# Tracheostomy in Posterior Fossa Cerebellopontine Angle Tumours in Neurosurgery: A Tertiary Care Institute Experience

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**Abstract:** ***Tracheostomy in the neurosurgical setting is an important tool for airway maintenance, especially in Cerebellopontine angle tumour patients. A retrospective study was conducted at the Neurosurgical centre of a tertiary care institute for analyzing the factors dictating early or late tracheostomy and its consequent early or late decannulation. 170 records were retrieved of which 15.8% underwent tracheostomy. Early Tracheostomy was defined as that conducted within 5 days of surgery and late between 5 and 30 days. Early decannulation was considered as one conducted within 30 days of tracheostomy and late as beyond 30 days. 79% underwent tracheostomy in the early period. There were no complications of tracheostomy in the cohort. The factors of early decannulation were younger age, tracheostomy performed in Operation Theatre and shorter duration of mechanical ventilation and it was associated with shorter Intensive Care Unit and Hospital stay.***

**Keywords**: Tracheostomy, Neurosurgery, Respiratory Aspiration

## 1. Introduction

Tracheostomy in the neurosurgical setting is an important tool for airway maintenance, indications being airway obstruction, aspiration of secretions, airway protection from aspiration and provision of mechanical ventilation[1]. Patients of Cerebellopontine angle (CP Angle) tumour have involvement of lower cranial nerves (LCN)[2] preoperatively or extensive handling of the LCN intraoperatively leading to their compromise perioperatively, hence tracheostomy may be required for these patients. However, prolonged tracheostomy due to the requirement of sustained care and patency issues is not desirable[3]. A retrospective study was conducted at the Neurosurgical centre of a tertiary care institute to determine the factors resulting in early and late tracheostomies/decannulations and their correlation with hospital stay, Intensive Care Unit (ICU) stay, days on mechanical ventilation and complication rates in patients of tracheostomy in CP angle tumor surgeries, to determine the frequency and predictors of successful extubations and tracheostomy in patients with cerebellopontine angle tumours requiring mechanical ventilation and to determine the optimal time for tracheostomy based on probability of successful extubation and in-hospital survival according to the duration of translaryngeal intubation.

## 2. Subjects and Methods

A retrospective study was conducted after obtaining approval from the institutional ethics committee. Records were retrieved from January 2010 to February 2012, 170 patient who underwent tracheostomy and, were enrolled in the present study. Clinical data were obtained retrospectively from patient record reviews using the Electronic Medical Records and the physical medical documents. Our hospital is a tertiary-care institution, with 14 ICU beds (open system) for neurosurgical patients. The decision to perform tracheostomy was made during medical rounds with the following criteria: (1) Patients requiring prolonged Mechanical Ventilation MV; (2) difficulty of weaning; and (3) weaning failure. In all patients, tracheostomy with a classic standard surgical technique was performed in the operating room or ICU by a neurosurgeon. Decannulation of tracheostomised patients was attempted on the following criteria: (1) resumption of adequate airway control (2) Adequate maintenance of spontaneous ventilation. Patients who could not achieve adequate airway control were discharged with the tracheostomy tube for subsequent follow-up. Such patients were categorised separately in the statistical analysis. Patients were divided into one of 2 groups based on the timing of tracheostomy. Tracheostomy was performed within 05 days of neurosurgery in the early group, and more than 05 days after the neurosurgery in the late group. The following data were compared between the 2 groups: age, sex, study population, comorbidity, Glasgow Coma Scale on ICU admission, ICU duration of stay and hospital duration of stay, total MV duration. The outcome measurements in the study were the total MV duration, ICU and hospital duration of stay, and time to decannulation.

### Exclusion Criteria

Patients with a pre-existing tracheostomy tube were excluded.

### Statistical Analysis

For continuous variables, values were compared using Student's t test for independent samples. Differences in proportions were compared using Chi square or Fisher exact tests when the cell size was small.

## 3. Results

170 records were retrieved of which 27 (15.8%) underwent tracheostomy, of which Males were 48.5% & Females were 51.5%. The mean age was 41.6 (Male=38.8; Female= 44.3) years. Early Tracheostomy was defined as that conducted within 5 days of surgery and late between 5 and 30 days. Early decannulation was considered as one conducted within

30 days of tracheostomy and late as beyond 30 days. 45% of patients underwent late decannulation while 33% underwent early decannulation whereas 22% were not decannulated. The average age of the early decannulation patients was younger than those having late decannulation by 5.3 years. The average hospital stay on those who had early decannulation was lesser than those who had late decannulation by 8.36 days. Similarly, the average ICU stay was also lesser by 5.3 days. The average days on mechanical ventilation was also lesser by 3.81 days. Those who were tracheostomised in the OT were 12.8% more in the early decannulation group than those tracheostomised in ICU. The average size of the tumour was 15.9 $cm^2$. 79% underwent tracheostomy in the early period. There were no complications of tracheostomy in the cohort.

## 4. Discussion

In the neurosurgeries involving CP Angle tumours; any irritation and injury of posterior fossa structures that may have occurred during surgery should be taken into account when planning extubation and postoperative care. There is a possibility of intraoperative injury to the cranial nerve nuclei or postoperative swelling in the posterior fossa region or both. Cranial nerve dysfunction, particularly of LCN can be particularly dangerous resulting in loss of control/ patency of upper airway and swelling of the brainstem that in turn can result in further impairment of LCN function such as impairment of respiratory drive[4].

Indications for tracheostomy are airway obstruction, aspiration of secretions, airway protection from aspiration and provision of mechanical ventilation[5]. Tracheostomy in the neurosurgical setting, especially in patients with CP angle tumours with perioperative compromised LCN, becomes an important tool for airway maintenance, protection from aspiration and if required for the provision of prolonged ventilation.

Tracheostomy has several advantages over translaryngeal endotracheal intubation including lower airway resistance, smaller dead space, less movement of the tube within the trachea, greater patient comfort and more efficient suction[5]. Patients requiring prolonged ventilation undergo tracheostomy to facilitate ventilator weaning, the incidence of serious infections decreases, oral hygiene and pulmonary toilet is facilitated, airway security is maintained and patient comfort is enhanced in selected patients by allowing nutrition and speech (Table 1).

Performing early tracheostomy may translate in form of various advantages like fast tracking of mechanical ventilation weaning, decreased duration of mechanical ventilation and decreased incidence of respiratory infections, thereby decreasing ICU and hospital stay. In our study, early tracheostomies were positively correlated with reduced the duration of the ICU and hospital say. Tracheostomy facilitates weaning from mechanical ventilation by decreasing airflow resistance in the artificial airway; thereby decreasing associated work of breathing, improving pulmonary toilet and hygiene. This decreases the incidence of respiratory infections and allows aggressive approach towards weaning protocols by clinicians as patient can be reconnected to ventilator in case of failure of weaning trial[6].

Though tracheostomy has many advantages but all efforts should be made for weaning from tracheostomy and early decannulation because issues of sustained care and maintenance of patency of the artificial airway make prolonged tracheostomy undesirable. Early decannulation decreases caregivers' involvement and helps the patient in vocalization, thereby improving quality of life. Teoh WH, Goh KY, Chan C conducted a retrospective review of 30 endotracheally intubated patients over a 2 year period, in the neurosurgical intensive care unit (NICU) who underwent elective open tracheostomies for prolonged ventilation and concluded that early tracheostomy in selected neurosurgical patients with poor Glasgow Coma Scale (GCS) scores was associated with reduced incidence of tracheobronchial colonisation by multiple pathogens, improvement in chest infections, and rapid weaning from ventilatory support[7]. Another study consisting of 116 consecutive neurosurgical patients who had tracheotomies performed during a 5-year period concluded that the performance of an early post injury tracheotomy may prevent the known complications of prolonged endotracheal intubation while providing effective ventilation and pulmonary toilet through safe and comfortable access to the airway and early post injury tracheotomy is not associated with a high incidence of significant complications in the neurosurgical patient population[8].

Qureshi A et al in their retrospective chart review of 69 patients with infratentorial lesions, who were mechanically ventilated during their intensive care unit stay in a neurocritical care unit at a university hospital, deciphered that an aggressive policy toward tracheostomy is justified based on the low frequency of successful extubations and high frequency of extubation failures and tracheostomies in patients with infratentorial lesions. They concluded that decision regarding tracheostomy should be made on day 8 of mechanical ventilatory support because of the low probability of subsequent extubation or in-hospital death[9].

There have been several studies in traumatic brain injuries where early tracheostomy has favorable results in comparison to late tracheostomy in terms of days on mechanical ventilation, ICU and hospital stay[10,11,12]. However, there is no literature on the timing on decannulation and its correlation with parameters such as ICU and hospital duration of stay and days on mechanical ventilation.

Keeping in view all these factors we conducted a retrospective study at the Neurosurgical centre of a tertiary care centre. The study objective was to determine the factors resulting in early and late tracheostomies as well as early and late decannulations and their correlation with the duration of hospital stay, ICU stay, days on mechanical ventilation and complication rates in patients of tracheostomy in CP angle tumor surgeries.

Our retrospective data analysis revealed that the factors of early decannulation were younger age, tracheostomy performed in OT and shorter duration of mechanical

ventilation. Early decannulation was associated with lesser days on mechanical ventilation, shorter ICU and Hospital stay. Early decannulation in the neuro-surgical setting leads to lesser morbidity and can be considered to be a significant factor towards recovery.

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**Table 1:** Advantages of Translaryngeal Intubation and Tracheostomy

| *Advantages of Translaryngeal Intubation* | *Advantages of Tracheostomy* |
|---|---|
| Easy and rapid initial placement of the airway device tract | Ease of reinsertion if displaced (after the tract has matured) |
| Acute surgical complications | Allows less skilled care |
| Bleeding | Reduced laryngeal damage |
| Posterior tracheal wall injury | Reduced laryngeal stenosis |
| Barotrauma | Less voice damage |
| Lower initial cost | Better secretion removal with suctioning |
| Avoids late surgical complications | Lower incidence of tube obstruction |
| Wound infections | Less oral injury (tongue, teeth, palate) |
| Recurrent laryngeal nerve injury | Improved patient comfort |
| Stomal stenosis required | Less sedation/analgesia required |
| | Better oral hygiene |
| | Better oral hygiene |
| | Improved ability to communicate |
| | Improved lip reading |
| | Allows speaking valve |
| | Preservation of glottic competence |
| | Less aspiration risk |
| | Lower incidence of ventilator-associated pneumonia |
| | Preservation of glottic competence |
| | Better preserved swallowing, which allows earlier oral feeding |
| | Lower resistance to gas flow |
| | Less tube dead space |
| | Lower work of spontaneous breathing |
| | More rapid weaning from mechanical ventilation |

## Author Profile

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