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Case Report

Early Tracheostomy in Adult Patient with Head Trauma: A Case Report

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ABSTRACT

Traumatic brain injury (TBI) is a serious condition that can cause temporary or permanent physical, cognitive, and emotional impairments. Tracheostomy in TBI patients can help reduce airway resistance, improve secretion clearance, and support weaning from mechanical ventilation. Early tracheostomy (ET) may also reduce ICU stay, ventilation time, and long-term mortality. A 30-year-old female was referred after a motorbike accident without a helmet. She was unconscious, with a Glasgow Coma Scale (GCS) of E1V2M1. Vital signs: temperature 38.1°C, pulse 74/min, respiratory rate 25/min, blood pressure 84/47 mmHg. Eye examination revealed lagophthalmos, chemosis, and a corneal epithelial defect. Neurological findings included anisocoria (right pupil 5 mm, left 3 mm), with no response in cranial nerves III, IV, and VI. Reflexes were normal, and no neck stiffness was observed. CT scan showed subdural hematoma (SDH), subarachnoid hemorrhage (SAH), and intracerebral hemorrhage (ICH). The patient underwent tracheostomy, central venous catheter placement, craniotomy, decompression, and hematoma evacuation. The bleeding volume was 15 cc. She survived and regained consciousness (GCS compos mentis). This case highlights the potential benefit of early tracheostomy in severe TBI. While patients with more severe injuries may face delays due to instability, early intervention can support better outcomes and survival.

INTRODUCTION

Traumatic brain injury (TBI) is a complex disorder which can affect the central nervous system, leading to temporary or permanent physical, cognitive, and psychosocial impairment [1 2]. TBI is a worldwide problem which incident with 939 case per 100.000 people and around 70 million people have a brain injury every year [3,4]. To maintain the airway and reduce risk of

hypoxemia in patients with TBI endotracheal tube is required [2,5,6]. Most patients suffering from significant acute brain injury require airway protection and mechanical ventilation in the acute period, generally with an endotracheal tube [7]. General indications for tracheostomy if patients has Glasgow Coma Scale (GCS) <8 and ventilator dependency >7 days [5].

According to the Brain Trauma Foundation, patients with TBI are at risk of pulmonary aspiration or compromised airway function, and initial treatment goals include early airway protection, adequate supplemental oxygen, and circulation support, ensuring that adequate oxygen and blood flow are delivered to the brain [8]. Patients TBI with tracheostomy may facilitate weaning by reducing dead space and airway resistance, and by improves clearance of secretions. Patients with tracheostomy have easier pulmonary toileting with tube suction which can reduce the incidence of nosocomial pneumonia [9]. This reduces the likelihood blockage of the tube by the mucus that comes out, making the patient more comfortable, requiring less sedation and reduction possible aspiration through an enlarged glottis function [10].

Tracheostomy may facilitate weaning in long-term mechanically ventilated patients, reduce intensive care unit (ICU) length of stay (LOS), and reduce complications from prolonged tracheal intubation [2 15]. Tracheostomy may reduce the need for sedation or cessation, reduce laryngeal lesions, and help fulfil to increase oral nutritional requirements and communication [11]. To prevent or reverse hypoxemia and provide oxygen to the tissues during acute respiratory failure, a tracheostomy can be performed as an effort to maintain the airway [12].

CASE REPORT

A 30 years old female, an unconscious patient with Glasgow Scale E1V2M1 after a motorbike accident and not wearing a helmet so patient's head hit the asphalt of the road. The patient is a referral patient and has an IV nasal line, catheter and NGT. Examination in the emergency room with a Glasgow Coma Scale score E1V2M1, blood pressure 132/71 mmHg, heart rate 62x/minute, respiration rate 24x/minute, saturation 99% on nasal oxygen, and temperature 34.7 ◦C. Results of physical examination of the head right eye lagophthalmos, chemosis, stromal epithelial defect at 5-7 o'clock pupil 5 mm. Warm acral extremities, weak palpable pulse, Neurological status: Nervus Craniales N II: Anisocoria d5mm/d3mm. Blood test revealed leucocytosis with neutrophilia (Table 1).

Table 1. Laboratory Test Result

Variable	*Results*	*Normal Value*
PDW	-	0-9
Leukocytes	17.4	4-10
Eosinophils	0	1-3
Basophils	0	0-1
Neutrophils	88	50-70
Lymphocytes	12	20-40
Monocyte	0	2-8
Erythrocyte	4.09	4.4-5.9
Haemoglobin	14	12-17
Haematocrit	35.9	35-45
MCV	87.8	80-100
MCH	34.1	22-34
MCHC	38.9	32-36
Platelets	220	150-45-
Blood glucose	145	70-140
Na	146	136-146
K	3.4	3.5-5.10

Head CT Scan examination: images of SDH, SAH, and ICH. The patient underwent tracheostomy, Central Venous Catheter (CVC), craniotomy, decompression, evacuation of SDH and traumatic laceration; SDH was found to be 2 cm, cerebral laceration, and ICH 15 cc, cerebral oedema, Cerebral decompression duraplasty osteoclasty. The timeline of the airway evaluation is presented in Fig. 1. The patient was admitted on June 7, 2024 and discharged on July 24, 2024, the patient was taken off the ventilator on June 14, 2024, moved from the ICU to the HCU/Inpatient ward on June 25, 2024 and decannulated on July 22, 2024.

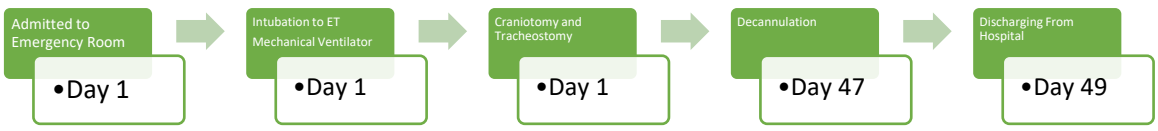

Figure 1. Airway Control Timeline in Patient

DISCUSSION

Tracheotomy is surgical procedure of 'opening the trachea', derived from the Greek words trachea arteria (rough artery) and tome (cut)[11]. Surgical tracheostomy (ST) involves pretracheal dissection of tissue and insertion of a tracheostomy cannula while directly viewing the trachea [13]. Factors associated with having a tracheostomy include age, Glasgow Coma Scale (GCS) score <8, at least one non-reactive pupil thoracic trauma, and hypoxemia in initial assessment [14]. The main indications for tracheostomy include protection and access to the airway for removal of secretions, prolonged MV (mechanical ventilation), upper airway obstruction, and reduction of dead space to facilitate weaning from ventilation. Tracheostomy may facilitate weaning in long-term

mechanically ventilated patients, reduce intensive care unit (ICU) length of stay (LOS), and reduce complications from prolonged tracheal intubation [2] [15].

Early tracheostomy (ET) is defined in most studies as undergoing tracheostomy within 3-7 day of intubation [16]. Early tracheostomy is a procedure performed in <4 days. In our study, this patient, tracheostomy was performed on the first day of hospitalization (Fig. 1). Research (Nada *et al.,* 2024) showed early tracheostomy (≤ 8 days) reduced ICU stay, although delay in tracheostomy did not affect the prevalence of nosocomial pneumonia or beyond survival of this patient. Furthermore, result from Systematic Review and Meta-Analysis from (Marra *et al., 2021)*, late tracheostomy can increase of mortality. Meanwhile in the cohort study (Robba *et al.,* 2020), patients who received late tracheostomy had a significant longer mean LOS in ICU and hospital.

Our patient was hospitalized for 49 days with decannulation performed on the 45th day of treatment. The patient was transferred from the ICU to the inpatient ward on the 44th day of treatment (Table 2). Timing of tracheostomy placement can reduce the severity of injury which can achieve successful extubating quickly, especially in patients with progressive disease and can result in early death [15]. Tracheostomy placement is used under the condition of maintaining a long-term (>7days) artificial airway which can reduce the requirement for sedatives, shorter ICU and hospital length of stays (LOS), ease of nursing care [17] [18]. In a systematic review from 9 studies and 5106 patients, early tracheotomy can reduce Ventilator Associated Pneumonia (VAP), ICU, and Length of stay (LOS) in ICU and hospital, and duration of mechanical ventilation [2] [9].

Although the advantages of early tracheostomy are still debated [14], our patient is able to survive and become compos mentis (Table 2). Result a Meta-analysis by McCredie *et al* explain ET can reduce the long term mortality, duration of mechanical ventilation, and LOS [7]. Patients in ICU with ET had a shorter ICU and hospital stay which was associated with recovery and hemodynamic instability with relief from the use of mechanical ventilation [2]. The use of ET in patients with trauma can reduce hospital length of stay which is associated with lower sedation requirements and lower medical costs [19].

Patient with acute brain-injured within the first 10 days of intubation might reduce long-term mortality and may also lower mortality [7]. The incidence of bleeding after tracheostomy is around 5% [20] meanwhile, the patient did not experience post-tracheostomy bleeding and the patient was able to breathe spontaneously (Table 2). There was an increase in consciousness (GCS) in patients during 49 days of treatment. Patient was still in a coma in the first and second week. The patient began compos mentis after decannulation of the tracheostomy. This is in accordance with study by *Sruti, et al* the patients within the early tracheostomy group had a significantly lower average admission GCS score and a higher injury severity score [18] [21]. The patient's saturation was stable at 100% during treatment with mechanical ventilation and tracheostomy. After tracheostomy

decannulation on day 46 the patient was able to breathe spontaneously with 98% of saturation. The patient's hemodynamic during hospitalization were also stable (Table 3).

Table 2. General condition and Glow Scale Coma (GCS) in patient

Days of hospitalization	***Week of hospitalization***	***General condition***	***GCS***	***Saturation***
1	0	Weak	1/T/2	100%
7	1	Weak	Coma	100%
14	2	Weak	Coma	100%
21	3	Weak	Sopor	100%
28	4	Weak	Sopor	100%
35	5	Weak	Sopor	100%
42	6	Weak	Somnolent	100%
46	6	Weak (after decannulation)	Composmentis apathetic	98%
49	7	Weak	Composmentis	100%

Patients with a brain haemorrhage volume <5 mL have a greater chance of survival, while patients with a haemorrhage volume >10 mL die at an early stage [17]. The patient had intracerebral bleeding of 15 cc, but the patient survived. The advantage of patients with early tracheotomy is that patients with more severe injuries may require longer time to control the evolution of skull damage and stabilize their condition, thereby delaying tracheotomy, or may have worse expected outcomes, thereby hindering the decision to tracheostomy.

Patients with long-standing MV have the possibility of irritation of the upper respiratory tract of the orotracheal tube which can cause inflammation and scarring of the trachea. [9]. Classification of tracheostomy based on time is divided into 3, immediate, early (0-7 days of procedure) or late (beyond day 7). Immediate complications include haemorrhage, air embolism, aspiration, loss of airway, hypoxemia, hypercarbia, damage to nearby structures, and death. Early complications include haemorrhage, tube displacement, pneumothorax, pneumomediastinum, subcutaneous emphysema, stromal infection, stomal ulceration, accidental decannulation, and dysphagia. Meanwhile late complications such as tracheal stenosis, tracheomalacia, granulation tissue, pneumonia, aspiration, trachea vascular fistula, tracheoesophageal fistula, accidental decannulation, and dysphagia [22].

Table 3. Vital sign in patient

Days of hospitalization	*Blood Pressure (mmHg)*	*Heart Rate (x/ minute)*	*Saturation*	*Resoiratory Rate (x/minute)*
1	99/54	77	100%	15
7	113/72	75	100%	18
14	116/57	68	100%	40
21	116/70	67	100%	22
28	113/66	66	100%	18
35	100/58	93	100%	19
42	107/65	68	100%	16
46	102/70	93	98%	22
49	134/84	75	100%	20

CONCLUSION

Early tracheostomy (ET) in patients with severe traumatic brain injury (TBI) can significantly improve clinical outcomes. In this case, a 30-year-old female with intracerebral hemorrhage, subdural hematoma, and subarachnoid hemorrhage underwent tracheostomy on the first day of hospitalization. The procedure facilitated early weaning from mechanical ventilation, reduced ICU length of stay, and contributed to improved neurological recovery. The patient achieved full consciousness (GCS compos mentis) by the end of treatment, demonstrating the potential benefits of ET in enhancing survival and reducing complications associated with prolonged intubation. Although some debate remains regarding the optimal timing, this case supports growing evidence that early tracheostomy, when clinically appropriate, can contribute to better patient outcomes in TBI cases.

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