Original Article

Indian Journal of Trauma and Emergency Pediatrics
Volume 9 Number 3, July - September 2017
DOI: http://dx.doi.org/10.21088/ijtep.2348.9987.9317.1

Outcome of Early, Before 3rd Day V/S Any Time after 5th Day Elective Tracheostomy in Isolated Head Injury with Diffuse Axonal Injury without Any Surgical Lesion

Amresh S. Bhaganagare*, Prakash Rathod, Balaji S. Pai***, Vikas Naik****, Nagesh S.A.*****, Prakash Rathod****

Abstract

Patients with isolated severe head injury with diffuse axonal injury and without any surgical lesion poses challenging task, this patient's need airway control in view of low Glasgow coma scale and possibility of aspiration pneumonia, which increases mortality. One hundred and forty patients with GCS score below 10 werecategorized into four groups. Group A – patients with GCS 7-10 and tracheostomy done within 3 days, Group B- patients with GCS 7-10 and tracheostomy was done after 5 days, Group C- patients with GCS below 6 and tracheostomy done within 3days, and Group D- patients with GCS below 6 and tracheostomy was done after 5 days. The characteristics of these four groups were compared based on the day on which patient was weaned from the ventilator support and connected to T-piece, development of fresh lower respiratory tract infection and death during hospital stay. *Results*: out of the 140 patients of isolated head injury with diffuse axonal injury without any surgical lesion the average day when patients were weaned from ventilator and connected to T- piece was 4th day in group A, 7th day in group B, 12th day in group C and 19th day in group D. The incidence of lower respiratory tract infectionwas 20% in group A, 31% in group B, 80% in group C and 52.5% in group D. And the mortality while in our hospital was 6.6% in group A, 14% in group B, 40% in group C and 52.5% in group D. *Conclusions*: Tracheostomy offer advantages in the management of patients of isolated head injury with diffuse axonal injury without any surgical lesion on mechanical ventilation, in this population early tracheostomy can facilitate weaning, safely reducing patient exposure to the risks of MV, and therefore has a positive impact on mortality.

Keywords: Diffuse Axonal Injury; Tracheostomy; Mechanical Ventilation.

Introduction

Tracheostomy is a procedure commonly performed in patients admitted to the ICU with respiratory failure. Tracheostomy has been reported to have advantages over translaryngeal intubation, among them, the following are of note: easier handling of the airways; greater patient comfort and facility of communication, reducing the need for sedation; possibility of oral feeding; improved respiratory mechanics; reduced trauma in the oral cavity; prevention of ventilator-associated pneumonia (VAP); and easier weaning. However, despite being a safe procedure, tracheostomy can be associated with complications such as infection at the incision site, bleeding, subcutaneous emphysema, pneumothorax, tracheomalacia and tracheal stenosis (the last two can also occur in patients submitted to tracheal intubation) [1-5].

In patients with severe neurological injury, which lowers the level of consciousness, early tracheostomy can be especially beneficial. Frequently, such patients are on mechanical ventilation (MV) only due to the need for tracheal intubation to protect the airways. In such cases, tracheostomy can ensure the protection of the airways and allow the withdrawal of MV, avoiding exposure to its risk factors, particularly VAP, and allowing earlier discharge from the ICU.

In this study, we retrospectively evaluated the impact of early tracheostomy in isolated head injury with diffuse axonal injury without any surgical

Author Affiliation: Associate Professor **Student MCh Neurosurgery ***Professor and Head ****Assistant Prof. *****Associate Prof., Bangalore Medical College and Research Institute (BMCRI) Bangalore, 560002.

Corresponding Author: Amresh S. Bhaganagare, Associate Professor, Bangalore Medical College and Research Institute (BMCRI) Bangalore, 560002.
E-mail: amreshsb@yahoo.com

Received on 12.06.2017, **Accepted on** 28.06.2017

lesionwith emphasis on GCS score of 7-10 and GCS score below 6. We aim to report the outcome of four groups, based on the timing of elective tracheostomy done within 3 days verses tracheostomy done after 5 days in an already endotracheal intubated patient on ventilator as initial treatment modalities. This was done to determine the advantages of tracheostomy within 3 days verses tracheostomy after 5 days.

Materials and Methods

Our study is analysis of 140 patients of severe head injury with diffuse axonal injury admitted in Neurosurgery intensive care (ICU) unit of trauma center of Bangalore medical college and research center from June 2016 to May 2017. All the selected patients were admitted via emergency department. The referred patients were resuscitated, stabilized and intubated prior to transfer. Directly admitted patients were resuscitated, stabilized and intubated at emergency department. Subsequently all patients were sent for Computed tomography (CT) scan brain from the emergency department except those patients referred from district hospital with CT scan facility. All patients were reviewed by neurosurgical team and other respective departments at emergency department before transferring to the Neurosurgical Intensive Care Unit.

Inclusion Criteria

Patients of traumatic head injury with GCS score below 10, who were intubated and needed conservative treatment alone. We included patients with eye, nose and ear injury also, as they are integral part of the head.

Exclusion Criteria

All those patients who needed cranial surgery for decompressive surgery. All patients who had any other body part injury were excluded from the study. Patients with any other comorbid conditions were excluded from the study.

We had 140 patients (Table 1) with male / female ratio of 105 (75%):35(25%). 32 patients (22.8%) were below 19 year of age, 71patients (50.7%) were 20-45 years age, 18 patients (12.8%)were 46-60 years age and 19 patients (13.5%) were above 61 years of age.

This patients were categorized into four groups (Table 2) viz- Group A – patients with GCS 7-10 and tracheostomy done within 3 days, Group B- Patients with GCS 7-10 and tracheostomy done after 5 days, Group C-Patients with GCS below 6 and tracheostomy was done within 3 days and Group D- patients with GCS below 6 and tracheostomy was done after 5 days.

The clinical outcomes like, the day on which patient was weaned from mechanical ventilator and switched to T-piece after tracheostomy, whether or not patient developedlower respiratory tract infection (LRTI) / ventilator associated pneumonia (VAP) and the mortality in hospital for respective group was collected and tabulated.

Results

Out of the 140 patients included (Table 3), We had 45 patients in group A, 35 patients in group B, 20 patients in group C and 40 patients in group D. The average day when patients were weaned frommechanical ventilator (MV) and connected to T-piece was 4th day in group A, 7th day in group B, 12th

Table 1:

Age Range	Male	Female	Total (%)
Below 19 years	25	7	32(22.8)
20-45 years	50	21	71(50.7)
46-60 years	15	3	18(12,8)
Above 61 years	15	4	19(13.5)
Total(%)	105(75)	35(25)	140

Table 2:

GCS score	Tracheostomy within 3 days	Tracheostomy after 5days
7-10	group A (45 patients)	group B (35 patients)
Below 6	group C (20 patients)	group D (40 patients)

GCS- Glasgow coma scale
Group A – patients with GCS 7-10 and tracheostomy done within 3 days.
Group B- patients with GCS 7-10 and tracheostomy was done after 5 days.
Group C- patients with GCS below 6 and tracheostomy done within 3days.
Group D- patients with GCS below 6 and tracheostomy was done after 5days.

Table 3:

Number of Patients	day on which T –piece connected after tracheostomy	LRTI (%)	Mortality in Hospital (%)
Group 1 (45)	4 days	9(20)	3(6.6)
Group 2 (35)	7days	11(31)	5(14)
Group 3 (20)	12 days	16(80)	8(40)
Group 4 (40)	19 days	21(52.5)	21(52.5)
OVERALL(140)	-	57(40.7)	37(26)

GCS – Glasgow coma scale
LRTI- lower respiratory tract infections
Group A – patients with GCS 7-10 and tracheostomy done within 3 days.
Group B- patients with GCS 7-10 and tracheostomy was done after 5 days.
Group C- patients with GCS below 6 and tracheostomy done within 3days.
Group D- patients with GCS below 6 and tracheostomy was done after 5days.

day in group C and 19th day in group D. The incidence of lower respiratory tract infection was 20% in group A, 31% in group B, 80% in group C and 52.5% in group D. And the mortality while in our hospital was 6.6% in group A, 14% in group B, 40% in group Cand 52.5% in group D.

Discussion

Tracheostomy remains one of the most commonly performed procedures in the ICU for head injury patients. The timing of tracheostomy, however, remains a matter of controversy, and the recommendations are still based on the experience of specialists rather than on scientific evidence [7-8], tracheostomy will bring one or more of the following benefits: reduction in the need for sedation for patients to tolerate tracheal intubation; reduction in airway resistance in patients with borderline respiratory mechanics; psychological benefit due to the possibility of speaking and receiving oral feeding; and facilitation of active mobilization. The patients undergoing early tracheostomy have better outcomes: the duration of MV is shorter; the occurrence of VAP is lower (and, most importantly, the mortality rate is lower.

Most severe traumatic brain injury studies revealed high mortality rates between 25- 38% [9-11]. In our study, focusing on diffuse axonal injury without surgical lesion, the mortality rate was 26% andthe incidence of lower respiratory tract infection was 40.7%. When we compared the outcomes of four groups, we noticed the incidence of LRTI and mortality were 20% and 6.6% respectivelyin group A, 31% and 14% respectively in group B, 80% and 40% respectively in group C and 52.5% and 52.5% respectively in group D. The significant difference in LRTI and mortality between group A and group B and also between group C and group D suggests that early tracheostomy within 3 days is beneficial when compared to tracheostomy done after 5 days.Two additional findings (fewer cases of VAP within the first 3 days of MV and a greater number of ventilator-free days) suggest that early tracheostomy provides benefits.

Limitations of our study is, that patients and we do not have follow up data.Our study has significant limitations, particularly because it was retrospective study involving a small number of patients and we have not taken into consideration the brain imaging findings. In view of the retrospective nature of the study, the allocation to early or late tracheostomy was not randomized and might have been influenced by the impression of the physician in charge of the case, who was responsible for the decision regarding the timing of the procedure. Therefore, although the groups were homogeneous regarding the GCS scores and the neurological diagnoses, the possibility of a selection bias cannot be ruled out. As a result, our findings only raise the issue of the possible benefits of early tracheostomy in these patients, without confirming such benefits.

Conclusions

Tracheostomy offer advantages in the management of patients of isolated head injury with diffuse axonal injury without any surgical lesion on mechanical ventilation, in this population early tracheostomy can facilitate weaning, safely reducing patient exposure to the risks of MV, and therefore has a positive impact on mortality.

References

1. Boles JM, Bion J, Connors A, Herridge M, Marsh B, Melot C, et al. Weaning from mechanical ventilation. EurRespir J. 2007;29(5):1033-56.

2. Rodriguez JL, Steinberg SM, Luchetti FA, Gibbons KJ, Taheri PA, Flint LM. Early tracheostomy for primary airway management in the surgical critical care setting. Surgery. 1990;108(4):655-9.
3. Lesnik I, Rappaport W, Fulginiti J, Witzke D. The role of early tracheostomy in blunt, multiple organ trauma. Am Surg. 1992;58(6):346-9.
4. Perfeito JA, Mata CA, Forte V, Carnaghi M, Tamura N, Leão LE. Tracheostomy in the ICU: is it worthwhile? J Bras Pneumol. 2007;33(6):687-90.
5. Vianna A. Tracheostomy in patients on mechanical ventilation: when is it indicated? J Bras Pneumol. 2007;33(6):37-38.
6. MacIntyre NR, Cook DJ, Ely EW Jr, Epstein SK, Fink JB, Heffner JE, et al. Evidence-based guidelines for weaning and discontinuing ventilatory support: a collective task force facilitated by the American College of Chest Physicians; the American Association for Respiratory Care; and the American College of Critical Care Medicine. Chest. 2001;120(6 Suppl):375S-95S.
7. Rumbak MJ, Newton M, Truncale T, Schwartz SW, Adams JW, Hazard PB. A prospective, randomized, study comparing early percutaneous dilational tracheotomy to prolonged translaryngeal intubation (delayed tracheotomy) in critically ill medical patients. Crit Care Med. 2004;32(8):1689-94. Erratum in: Crit Care Med. 2004;32(12):2566.
8. Bruno do Valle PinheiroI; Rodrigo de Oliveira TostesII; Carolina Ito BrumII; Erich Vidal CarvalhoIII; Sérgio Paulo Santos PintoIII; Júlio César Abreu de OliveiraIV Early versus late tracheostomy in patients with acute severe brain injury*. J. bras. pneumol. vol.36 no.1 São Paulo Jan./Feb. 2010.
9. Moppett IK. Traumatic brain injury: assessment, resuscitation and early management. Br J Anaesth 2007;99:18-31.
10. Lee KK, Ng I, Ang BP. Outcome of Severe Head Injured Patients Admitted to Intensive Care During Weekday Shifts Compared to Nights and Weekends. Ann Acad Med Singapore 2008;37:390-6.
11. Isa R, Wan Adnan WA, Ghazali G et al. Outcome of severe traumatic brain injury: comparison of three monitoring approaches. Neurosurg Focus 2003;15: E1.