

EARLY TRACHEOSTOMY IN HEMORRHAGIC STROKE: DOES IT HELP IN PATIENT MANAGEMENT ?

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Publication Info

Paper Submission Date
16th February 2016

Paper Acceptance Date
6th June 2016

Paper Publication Date
July 2016

DOI

Abstract

Introduction: Airway protection is often required in the management of stroke patients for the reason of low consciousness levels and associated risk of aspiration and pneumonia. This has been achieved either through endotracheal intubation or tracheostomy – both having their separate indications and advantage/ disadvantage.

Material and Methods: This prospective study was done on 26 patients getting admitted to neurosurgical unit with hypertensive intra cerebral hemorrhage. Based on projected recovery time, tracheostomy was performed if recovery was expected to take a long course. Evaluation was done- if tracheostomy helped in early weaning from ventilator, incidence of sepsis and overall ease of patient management.

Result: Tracheostomy was performed in 26 patients of hemorrhagic stroke over a period of 30 months. All the tracheostomies were performed within first 8 days of hospital stay. In 14 cases it was done within 3 days of hospital stay. 19 out of 26 cases (8/14 in early tracheostomy vs 11/12 in late tracheostomy group) required ventilatory support for variable time period- ranging from less than a day to 8 days. Overall incidence of sepsis was approximately 65%.

Conclusion: Tracheostomy if done early, may reduce the need for prolonged ventilation apart from easing patient management- both in and out of ICU settings.

Keywords : Airway, Intubation, Tracheostomy, Hemorrhagic stroke

INTRODUCTION

Securing the upper respiratory tract is the first step of resuscitation- especially in management of serious medical conditions where patient's consciousness is low. It remains the fundamental aspect of emergency and critical care medicine.

Hemorrhagic stroke is a commonly encountered complication of uncontrolled hypertension. Intra-cranially, it varies in location and volume and both these factors, determines the neurological presentation & outcome. Quite often the patients are unconscious or in altered sensorium for a prolonged period of time and hence, at risk of developing secondary complications including aspiration and pneumonia. Such patients need continued critical care till the cerebral edema and hemorrhage gets resolved by appropriate means and the basic reflexes recover enough to take care of oneself.

Protection of airway is important in management of such cases, as the unconscious patient retains and aspirates all

the secretions in the airway. If left unmanaged, these patients consequentially develop aspiration pneumonia, sepsis, wherein the ventilatory support, high end antibiotics, prolonged ICU stay etc. becomes essential. This is best prevented by oro-tracheal intubation- which not only ensures smooth airflow to lungs but also provides a conduit to drain the infected secretions. However oro-tracheal intubation has its own share of problems, for example – dead air space, poor oral hygiene, tube bite etc. The solution to this is tracheostomy, at an appropriate time period, which not only reduces the efforts of breathing but may also facilitate early weaning off from ventilator and possibly shortening of ICU stay.

MATERIAL & METHODS

This prospective study was done on 26 patients over a period of 30 months. All patients getting admitted to neurosurgical unit with hypertensive intra-cerebral hemorrhage were evaluated on Glasgow Coma Scale (GCS), associated respiratory problems and CT findings.

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These were then correlated to predict expected clinical course and the duration for which patient was likely to be in need of critical care. All patients with GCS of 8 or less at time of admission or during treatment were intubated with cuffed endotracheal tube. Conversion to tracheostomy was guided by anticipated time interval to recovery- if expected to take more than 10 days, it was invariably performed. Observation and analysis was further carried to evaluate-if tracheostomy facilitated early weaning from ventilator, incidence of sepsis, factors leading to continued need of ventilatory support and duration of ICU stay. Criteria used for sepsis was – TLC <4000/mm³ or > 12000/mm³, Respiratory rate >20 /min and fever – at least 2 criteria had to be there.

RESULTS

Tracheostomy was performed in 26 patients of hemorrhagic stroke over a period of 30 months, between 2010-2012. It was done on elective basis for the sole indication of airway protection in patients having low level of consciousness and were unlikely to recover early i.e. over next 10 days at least.. Average Glasgow Coma Scale score was 6 to 7 at time of tracheostomy. All the tracheostomies were performed within first 8 days of hospital stay. In 14 cases it was done within 3 days of admission and in remaining 12 patients –between 4-8 days. It was done under local anesthesia in majority (20 patients). Per-cutaneous technique was used in 2 patients and all other went routine open surgical method. Average surgical time was 6 minutes. Of the 26 patients, 14 had underwent surgery for evacuation of intra-cerebral hematoma. Here tracheostomy was done in conjunction with craniotomy in 7 cases & in remaining 7, it was required later on as patients sensorium did not improve with surgery.

Timing of tracheostomy (Number)	1-3 days (14)	4-8 days (12)
Average GCS score	5	7
Pt requiring Vent support	8	11
Average ventilated time	2.2 days	4.1 days
Average ICU stay		
For ventilated pt	6.1 days	6.7 days
For Non ventilated pt	1	3
Sepsis	8 (57%)	9 (75%)
Total No. of Cases	26	

19 out of 26 cases (8/14 in early tracheostomy vs 11/12 in late tracheostomy group) required ventilatory support for variable time period- ranging from less than a day to 8 days. Post tracheostomy, 3 could be weaned from ventilator on same day as they were generating adequate tidal volume

with minimum ventilatory support. The tracheostomy reduced the dead space-this further augmented the unassisted respiratory effort leading to easy weaning off from ventilator. Though the overall average of ventilated days was 3.1, it was much less-2.2 vs 4.1 days, in group undergoing early tracheostomy.

Overall incidence of sepsis was approximately 65% but on comparing the two groups – it was 57% vs 75% in early vs late tracheostomy.

Average time to de-cannulation was 14 days- ranging from 7 to 50 days. There were no surgical complications. However 2 patients had tube block in ward requiring urgent intervention & 3 patients had suction associated bleeding of non serious nature from trachea. Even though tracheostomy management seems to be easy, few errors of care were also observed – giving oxygen via face mask instead via tracheostomy, closing the cap on T mount when patient is on unassisted breathing.

In 4 patients, early de-cannulation was not possible and hence - they were discharged with tracheostomy after proper training to attendants with advice to be in touch with a specialist to manage any problem should there be any.

DISCUSSION

Cerebro-vascular accidents are crippling disorders, rendering patients severely disabled for prolonged time periods. Recovery process is lengthy and quite often incomplete. Significant number of patients deteriorate and die of secondary complications. These are not only quite common, the estimates of frequency being 40% to 96% of patients^{1,2} but are universally related to poor outcome. Aspiration and pneumonia are the most common respiratory complications of stroke³, which are potentially preventable or treatable if recognized.⁴

In 1989, the American College of Chest Physicians' Consensus Conference on Artificial Airways in Patients Receiving Mechanical Ventilation recommended that tracheostomy should be considered in patients anticipated to require endotracheal intubation for more than 21 days.⁵ This is an older concept. More recently it has been suggested that tracheostomy be considered within 2–10 days of intubation, and that a projected need for 14 days of intubation be used as the criterion for the procedure.⁵ Otorhinolaryngologists have suggested that tracheostomy be performed within several days of intubation, to prevent laryngeal injury from even very short periods of intubation.⁶ The basic purpose of tracheostomy is – to provide a safe access to upper respiratory airway for the

purpose of low effort breathing, managing the retained secretions and access to airway for prolonged mechanical ventilation.

Though the timing of this procedure remains a subject of debate, best is to tailor the decision as per individual case need & should take into consideration - the risks and benefits of prolonged endotracheal intubation versus tracheostomy. It is reasonable to do it at the earliest convenient time, often within 3–4 days of intubation. Accepted advantages are reduced breathing effort due to reduction in dead space of ventilation, less pharyngeal and laryngeal lesions than with prolonged orotracheal intubation, better oral hygiene and nursing care, and higher patient comfort.⁷ It was for these reasons that 3 of our patients could be weaned from ventilator on the day of tracheostomy. Managing tracheostomy is relatively easy both in and out of ICU with regular nursing staff. Even patient's attendants are also encouraged to participate in tracheostomy care so that they know how to manage it, in the event patient needs to be sent home with tube.

A delay in converting translaryngeal intubation to tracheostomy had been associated with longer ICU stays; conversely, early tracheostomy has been associated with a reduction in ICU stays, mechanically ventilated days, and length of hospital stay.^{8,9} The results of our short case series is partly in accordance to these findings as our patients in early tracheostomy group required lesser days of ventilatory support. However, this did not help in significantly reducing incidence of sepsis or length of ICU stay. A randomized pilot trial SETPOINT¹⁰ conducted between 2009-2011 on 60 patients, also arrived at similar conclusions. More importantly to be noted, the other findings of SETPOINT were- higher need of sedation and higher ICU and 6 months mortality in delayed tracheostomy group.

The sub-group undergoing early tracheostomy had patients with poorer GCS (5 vs 7) due to larger hematoma volume or because of its location in brainstem/ cerebellum and hence were very likely to take a longer path to recovery. They therefore underwent early intervention either in terms of hematoma evacuation if needed and or tracheostomy. This possibly might have saved the respiratory and CNS complications (cerebral edema) leading to reduced need of ventilatory support. In contrast, the other group had patients with delayed neurological deterioration because of multiple reasons, forcing the need for tracheostomy and ventilatory support. 11 out of 12 patients required ventilatory support in this group. The main reasons leading to extended ventilatory requirement was the need to

manage respiratory failure secondary to alveolar hypoventilation, aspiration pneumonia, pre-existing COPD etc. Progressive nutritional asthenia or coma related lung complications were other important causes of same.

As regards sepsis, the overall incidence was very high (65%). Possible causes were multiple disease related secondary complications, timing of shifting to ICU and surgical intervention, sepsis on admission, skills of nursing staff, management in ICU vs ward, Health care insurance vs self paid patients, errors of judgement, co-morbid conditions or even the degree of participation by family members in patient care. Common source of sepsis were respiratory pathway, urinary tract and venous access. It is worth mentioning that in early tracheostomy group, 7 patients underwent surgical intervention (craniotomy and or tracheostomy) in first 24 hours of hospitalization i.e. even before the time the disease related secondary complications start - this might have been one of the reasons for apparently lower incidence of sepsis (57% vs 75%). However, contrary to expectation- the shorter ventilation time and lesser incidence of sepsis in early tracheostomy group did not transform into shorter ICU stayed -6.1 day vs 6.7 day. Hence, this emphasizes the need for larger prospective case series with multifactorial statistical analysis to draw any meaningful conclusion.

It needs to be absolutely clear that tracheostomy in this setting, is a tool for better patient care and comfort- equally easing the life of health care provider and possibly helps in reducing mortality also. Whether this transforms into meaningful survival, was not a part of this study and needs large multicentric prospective studies.

CONCLUSION

Hemorrhagic strokes are devastating neurological conditions where secondary complications badly affect patient management and outcome. The results of our study presumably indicates that early tracheostomy is safe and may reduce the need for prolonged ventilation. However, if this can also lead to reduced sepsis or a shorter ICU stay, needs larger double blind studies to arrive at a meaningful conclusion.

REFERENCES

1. Davenport RJ, Dennis MS, Wellwood I, Warlow C. Complications after acute stroke. *Stroke*. 1996;27:415–420.
2. McClatchie G. Survey of the rehabilitation outcomes of stroke. *Med J Aust*. 1980;1:649–651.

3. Rochester CL1, Mohsenin V. *Semin Respir Crit Care Med*. Respiratory complications of stroke. Jun;23(3):248-60. 2002
 4. P. Langhorne, D. J. Stott, et al. Medical Complications After Stroke: A Multicenter Study. *Stroke*. 2000;31:1223-1229
 5. A L Plummer, D R Gracey. Consensus conference on artificial airways in patients receiving mechanical ventilation. *Chest*, 1989;96(1): 178-180
 6. McWhorter AJ. Tracheostomy: timing and techniques. *Curr Opin Otolaryngol Head Neck Surg* 2003;11(6):473-479.
 7. Bösel J1. Tracheostomy in stroke patients. *Curr Treat Options :Neurol*. 2014 Jan;16(1):274.
 8. Diehl JL, El Atrous S, Touchard D, Lemaire F, Brochard L. Changes in the work of breathing induced by tracheostomy in ventilator-dependent patients. *Am J Respir Crit Care Med*. 1999;159(2):383-388
 9. Boles JM, Bion J, Connors A, et al. Weaning from mechanical ventilation. *Eur Respir J* 2007;29(5) 1033-1056
 10. Julian Bosel, Petra Schiller et al; Stroke-Related Early Tracheostomy Versus Prolonged Orotracheal Intubation in Neurocritical Care Trial (SETPOINT): A randomized pilot trial. *Stroke*, 2013;44:21-28.
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