

Early vs. late tracheostomy for the ICU patients: Experience in a referral hospital

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ABSTRACT

Objectives: The aim of this study is to present our experience with elective surgical tracheostomy for intensive care unit (ICU) patients who needed prolonged translaryngeal intubation in order to evaluate the proper timing and advantages of early vs. late tracheostomy and to stress upon the risks associated with delayed tracheostomy. **Methods:** Medical records of all patients, who underwent elective tracheostomy for prolonged intubation from September 2006 to August 2010 at Jordan University hospital, were reviewed. **Results:** A total of 106 patients (74 males) were included; their age ranged from 2 months to 90 yr with mean age of 46.5 yr. The mean time at which tracheostomy was done after initial tracheal intubation was 23 days (range 3-7 weeks). Trauma was the most frequent cause of ICU admission 38 (35.8%), followed by post-surgery causes 14 (13.2%). An early tracheostomy showed less complication vs late procedure. The length of stay in the ICU for patients who had an early tracheostomy was 26 days while this period for patients who had late tracheostomy was 47 days. Mortality rate among patients who had early tracheostomy was 17.1% while for late tracheostomy patients, it was 36.1%. **Conclusion:** Proper assessment and early tracheostomy is recommended for patients who require prolonged tracheal intubation in the ICU.

Key words: Intensive care unit, prolonged tracheal intubation, tracheostomy

INTRODUCTION

Tracheostomy is among the most frequently performed procedure in critically ill patients, being done in about 24% of patients in ICU^[1]. The benefits of tracheostomy over prolonged intubation are: Reduced use of sedation, reduced trauma to the oropharynx and larynx, reduced work of breathing and improved clearance of pulmonary secretion, decreased periods of mechanical ventilation and consequently length of ICU and hospital stay.^[2-4]

Patients, who had prolonged tracheal intubation and consequently had late tracheostomy, had more complications; airway injuries and ventilator-associated pneumonia than those who underwent early tracheostomy.^[5-8]

Consensus for timing of tracheostomy in critically ill patients has not yet been reached.^[9] The 3-week time limit of tracheal intubation in critically ill patients was based on the belief that the risk ratio (laryngeal risk vs. surgical tracheostomy risk) was excessive if the endotracheal tube was left much longer than a month, and thus tracheostomy for the ICU patients is considered early if it is done within 3 weeks of tracheal intubation.^[8-11]

The purpose of our study is to assess the benefits of early vs. late tracheostomy, stress upon the risks associated with late tracheostomy and to compare our results with the international data.

METHODS

The medical records of all patients, who underwent tracheostomy because of prolonged tracheal intubation from September 2006 to August 2010 at Jordan university hospital, were reviewed. Over a period of 4 years (2006-2010), all patients admitted to the ICU, who had tracheal intubation at Jordan University hospital and failed extubation or/and weaning, were considered for inclusion in this study. Patients, who needed emergency

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tracheostomy, were excluded from this study. Tracheostomy was performed using standard surgical techniques in the main theater. The timing of tracheostomy depended on the attending physician's decision. Medical records were analyzed for age, sex, underlying diseases due to which patients were admitted to ICU, complications occurred with prolonged tracheal intubation, postoperative complications due to tracheostomy, mortality rate, and the length of stay in the ICU. A follow-up period ranged from 1 to 6 months.

RESULTS

A total of 106 patients, who underwent an elective surgical tracheostomy because of prolonged tracheal intubation and failed extubation or/and weaning, were included in this study. Out of these 106 cases, there were 74 (70%) males and 32 (30%) females, and their age ranged from 2 months to 90 yr with a mean age of 46.5 yr. The reasons for their tracheal intubation and consequently their admission to ICU are summarized in Table 1. Early tracheostomy (within 3 weeks of an ICU admission) was done in 70 (66%) patients while 26 (24.5%) patients had the tracheostomy done in the 4th week, 6 (5.7%) done in the 5th week, 3 (2.8%) cases done in the 6th week, and 1 (.9%) case of tracheostomy was done in the 7th week of tracheal intubation. The complications of tracheal intubation and their relation to the time at which tracheostomy was done are shown in Table 2. The length of stay in the ICU for these patients was 41 days, ranged from 3 to 28 weeks (26:47 days early to late tracheostomy

ratio), and the overall mortality rate was 26 (24.5%), notably higher death rate 13 (36.1%) among late tracheostomy than early tracheostomy 13 (17.1%).

DISCUSSION

We adopted a 3-week time limit to convert tracheal intubation into tracheostomy in critically ill patients based on the recommendations of American College of Chest Physicians.^[12] Although percutaneous dilatational tracheostomy (PDT) has low complications rate, we used the standard open surgical tracheostomy and not PDT due to the fact that the later is associated with higher mortality rate.^[13] Classically, tracheostomy is superior to prolonged tracheal intubation for the ICU patients due to reduction in dead space and airway resistance, early weaning from ventilator, decrease rate of airway infection, decrease in the ICU stay and consequently reduced overall cost.^[14-16] In our study, we are still having a lot of delay in performing a tracheostomy for the ICU patients at Jordan University Hospital (34%) due to medical and non-medical reasons. In our series, trauma was the most frequent cause of ICU admission (35.8%), which is probably due to the fact that we have a high rate of road traffic and other accidents in Jordan. Pneumonia is the most commonly reported nosocomial infection among ICU patients, occurring predominantly in individuals requiring mechanical ventilation and the prevalence ranges from 10% to 65%, and the associated fatality rates are more than 20%.^[17] The rate of ventilator-associated pneumonia among our patients was 33, more common with patients who had late tracheostomy (41.7%) than with early tracheostomy patients (28.6%). However, some evidence also exists, which suggest that an early tracheostomy does not improve patient outcome.^[18,19] Regarding airway injuries, we have found that 12 (33.3%) of our patients who had late tracheostomy did develop airway injuries while 16 (22.9%) of patients with early tracheostomy had airway injuries, and these figures are close to others studies.^[14,15] Among our patients, 3 (8.3%) developed acute respiratory distress syndrome with late tracheostomy and 3 (4.3%) developed this complication with early tracheostomy; same observation has been noticed by Möller and coworkers.^[14] ICU mortality rate among our patients was less in late tracheostomy patients, which is in consistence with Hsu and coworkers.^[20] However, a meta-analysis did not demonstrate a decrease in mortality rates among patients who had an early tracheostomy.^[21] In a retrospective analysis by Bickenbach *et al.*, early tracheostomy was found to reduce the duration of artificial ventilation as well as ICU length of stay, which was observed among our patients as well.^[22] The complications rate occurred due to the procedure itself among our ICU patients were close to the international data.^[23-25]

Table 1: Causes of intubation in the ICU at Jordan University Hospital (2006-2010)

Causes	N (%)
Trauma	38 (35.8)
Post-surgery	14 (13.2)
Pulmonary diseases	12 (11.3)
Cerebro-vascular accident	10 (9.4)
Congestive heart failure	8 (7.5)
Diabetes mellitus	6 (5.8)
Spontaneous intracranial bleeding	5 (4.7)
Burns	5 (4.7)
Congenital malformations	4 (3.8)
Chronic renal failure	4 (3.8)

Table 2: Complications of tracheostomy in the ICU at Jordan University Hospital (2006-2010)

Type of complication	Early tracheostomy n (%)	Late tracheostomy n (%)
Ventilator associated pneumonia	20 (28.6)	15 (41.7)
Acute respiratory distress syndrome	3 (4.3)	3 (8.3)
Airway injuries	16 (22.9)	12 (33.3)

In conclusion, our results show that an early tracheostomy helps to reduce the complications rate, shortens the ICU stay, lower the mortality in the ICU, and consequently will result in decreasing the cost in cases with prolonged tracheal intubation. Therefore, close assessment of ICU patients for proper timing of doing tracheostomy is essential.

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