

Elective open bedside tracheostomy in the neurosurgical intensive care unit

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ABSTRACT

Background and Objectives: Tracheostomy is electively performed in critically ill patients requiring prolonged respiratory support. The risk of transporting, the increasing associated cost and operative room schedule are some of the obstacles for wider acceptance of this procedure. The use of rigid selection criteria exclude many patients who would benefit of this approach. The present study was designed to determine the safety of open bedside tracheostomy (OBT) as a routine intensive care units (ICU) procedure without any selection criteria, considering its peri and postoperative complications. **Materials & Methods:** Retrospective medical chart review of all patients that underwent elective tracheostomy between June 2014 and January 2015. **Results:** The study group comprised 52 patients with a mean age of 40.4±15.1 years. The incidence of intra-procedure complications was 5.7% and post-procedure complications was 3.8%. **Conclusions:** Open bedside tracheostomy seems to be a safe and simple procedure, even when performed by a trained resident under controlled circumstances, and should be considered as an option for ICU patients.

Key words: Complications, Intensive care units, Tracheostomy

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INTRODUCTION

Securing the airway by way of a tracheostomy had been reported back to ancient times. The procedure was popularized in the early 1900s by Chevalier Jackson and is currently used in intensive care units (ICU) across the world.¹ Tracheostomy is electively performed in critically ill patients requiring prolonged respiratory support or frequent bronchopulmonary toiletting, or to help with weaning from mechanical ventilation. It is better tolerated than oral or nasal tracheal intubation and is thought to reduce sedation requirements and time in the intensive care unit (ICU).²⁻⁶

The concept of bedside tracheostomy is attractive, and surgeons have started performing open bedside tracheostomies (OBT). This approach has proved to be safe in selected patients.⁷⁻¹⁰ In a prospective randomized study, Massicket al¹⁰ found excellent results and stated that OBT represents the standard of care in bedside tracheostomy, since it provides a more secure airway at markedly reduced patient charge. The primary objective of this study was to determine the safety of OBT as a routine ICU procedure without any selection criteria, considering its peri- and postoperative

complications.

MATERIALS AND METHODS

The neurosurgical ICU of the college of medical sciences and teaching hospital (COMS-TH), Bharatpur, Nepal had an established bedside tracheostomy protocol. A retrospective medical chart review was conducted including all 52 intubated patients who underwent elective ICU tracheostomies between June 2014 and January 2015. Indications and timing were decided by the neurosurgical team. This study was approved by the Institutional Ethical Committees; informed consent was taken. No selection criteria at all were adopted. All operations were performed by trained neurosurgical residents assisted by either another resident or ICU nurse who were previously trained and knew all necessary materials and surgical steps. Coagulation disturbances, if present were appropriately corrected to permit the surgical approach. Hemodynamic parameters and oxygen saturation were monitored constantly throughout the procedure. A trained ICU nurse was always present to insure respiratory care and to help with extubation.

The technique used was that standardized at the facility. The patients were sedated with intravenous midazolam and maintained in the horizontal supine position. A pad was placed under the scapular region for neck extension. After antisepsis, sterilized cloths were placed on site, and a solution of 2% lidocaine was used for local anesthesia. A 3 cm horizontal skin incision was made, and the muscles were split longitudinally until the tracheal rings could be seen. The opening in the trachea was made, using a scalpel, in a "U" shape, and the cuffed tracheostomy tube of sizes varied from 6.5 to 7.5 was inserted through the tracheal opening immediately after the orotracheal tube was removed. The correct positioning of the tube was always confirmed by inserting an aspiration tube prior to connecting it to the mechanical ventilator, after which the tracheal tube was fixed.

Chest radiography was obtained the next day following the ICU routine to confirm appropriate tracheostomy placement and evaluate for pneumothorax. Complications of OBT were recorded up to 30 days after the procedure. Complications were defined as follows: failure to perform the procedure in the ICU, bleeding, subcutaneous emphysema, pneumothorax, pneumomediastinum, false passage during the insertion of the tube, fistula, and infection at the incision site. Stomal or endotracheal bleeding related to the procedure was considered significant (major) only if operative room (OR) exploration and/or blood transfusion was required. Bleeding was considered minor when controlled by digital compression, surgical tie or gauze packing in the ICU. Stomal infection was diagnosed when cellulitis around the stoma was present. Cost estimation for the open bedside procedure was estimated by including procedure charge, materials, drugs, and OR taxes when applicable.

RESULT

All the 52 patients admitted in the neurosurgical ICU who underwent tracheostomy were post-operative cases with the endotracheal tube in situ. 33 (63.5%) of them were in T-tube support who required prolonged respiratory support or frequent bronchopulmonary toileting and 19 (36.5%) of them were the one with difficulty in weaning from mechanical ventilation. All the tracheostomies were performed between 4th to 7th day of intubation (mean: 4.71 days).

The age of the 52 patients ranged from 15 to 70 years (Mean: 40.42 years). Out of the 52 patients, 34 (65.4 %) were male and 18 were female. The mean operation time was 28.63 minutes (range: 16

to 65 minutes).

Early complications during the procedure occurred in 3 (5.7%) patients and late complications occurred in 2 (3.8%) patients, as summarized in Table 1.

Table 1: Complications of open bedside tracheostomy

| Parameters | n | % |
|-------------------------------|---|-----|
| Intra-procedure complications | | |
| Minor bleeding | 2 | 3.8 |
| False tract | 1 | 1.9 |
| Post-procedure complications | | |
| Subcutaneous emphysema | 1 | 1.9 |
| Stomal infection | 1 | 1.9 |

The cause of the minor bleeding was the presence of aberrant vessels and both were managed in ICU by tying with the suture. A false tract was created during the procedure on a 48 years old obese gentleman who had a short neck and he developed subcutaneous emphysema localized to the neck which spontaneously disappeared after 6 days. Stomal infection was diagnosed in one patient by the presence of cellulitis around the stoma and was managed with daily dressing.

There were no procedure-related deaths, although 6 (11.5%) patients died of severe head injury. The mean cost for the procedure was NRs 1175.3 (range: 1100 to 1215 NRs), excluding the operation charge of NRs 3000 that was made free for every case.

DISCUSSION

When performed early, tracheostomy reduces the time on mechanical ventilation, the length of ICU stay, and the incidence of bronchopneumonia,^{11,12} as well as minimizing laryngeal trauma.¹³ Some authors¹² have reported a procedure-related morbidity of 4%, whereas others⁷ have reported that tracheostomy-related morbidity is 9.4% in the operating room and 8.7% in the ICU.

Though the tracheostomy literature offers a diverse opinion concerning contraindications to bedside performance, the safety of bedside tracheostomy has been established.^{7-9,14} Other authors have also suggested performing the procedure in the ICU as a safe and acceptably cost-effective alternative.¹⁵⁻¹⁷

Owing to the lack of available data concerning complications of tracheostomy performed in the operating room, it is difficult to make direct comparisons between our complication rate and those of tracheostomy performed in the operating room. However, our complication rates of 5.7% for major complications and 3.8% for minor complications are similar to many quoted in the

