

Original Article

Tracheostomy in the ICU: Is it worthwhile?*

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Abstract

Objective: To determine the feasibility of performing tracheostomy in the intensive care unit (ICU) environment and to assess procedure-related complications and mortality. **Methods:** The medical records of the 73 patients submitted to tracheostomy in the ICU of the Federal University of São Paulo *Hospital São Paulo* between January and November of 2003 were evaluated retrospectively. All operations were performed by surgical residents, under the supervision of a thoracic surgeon, using the open technique standardized at the facility. **Results:** The mean age of the patients was 55.2 years. Of the 73 patients evaluated, 47 (64.4%) were male and 26 (35.6%) were female. The most common indication was prolonged orotracheal intubation (76.7%). There was no procedure-related mortality, and, in all patients, the procedure was successfully performed in the ICU. Early complications occurred in 2 patients (2.7%), who presented increased local bleeding, which was controlled using compression. The late complication was infection at the incision site, which occurred in 2 patients (2.7%) and was treated by applying local dressings, without further clinical repercussions. **Conclusions:** Based on the results of our analysis, which are comparable to those found in the literature regarding tracheostomy performed in the operating room, we concluded that tracheostomy in the ICU is feasible and presents a low rate of complications, even when performed in critically ill patients and by surgeons in training. Therefore, in our view, it is possible to state that performing tracheostomy in the ICU is worthwhile.

Keywords: Tracheostomy; Intensive care units; Mortality.

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Introduction

Tracheostomy is a very common procedure in hospitals and is the surgical procedure most widely used in critically ill patients.⁽¹⁾ More than 4000 years ago, Asclepiades of Persia reported performing tracheostomies.⁽²⁾ Today, most such patients are usually connected to various devices, such as infusion pumps, cardiac monitors, and respirators, as well as being catheterized (venous and arterial catheters). Simply transporting such patients to the operating room can increase the risk of complications. In addition, the cost of the operating room and, frequently, the unavailability of the room for the performance of the procedure at the necessary time should be considered.^(1,3-5)

In the past, tracheostomy performed in the intensive care unit (ICU) was regarded as a procedure with high morbidity and mortality.⁽¹⁾ However, with the advent of smaller devices and more practical instruments, it has become easier to perform this procedure.⁽⁶⁾ Nevertheless, there are still doubts about the ideal locale at which to perform the procedure. Since tracheostomy deals with the airways, the operating room is postulated as the ideal place.

Is it true that the locale at which a tracheostomy is performed influences morbidity and the risk of infection? The great distance between the various ICUs in our facility and the operating room, the complexity of our hospital, and the great number of elective and emergency surgeries performed, as well as the experience acquired, have motivated our attempts to make the tracheostomy protocol simpler and more dynamic. We have now begun to perform the operation in the ICU environment. Therefore, the objective of the present study was to present the results obtained in patients submitted to tracheostomy in the ICU and to compare them to results found in the literature, analyzing the influence of the place at which the procedure is performed on the evolution and prognosis of the patients.

Methods

This was a retrospective study in which the medical records of the patients submitted to tracheostomy in the ICU of the Federal University of São Paulo *Hospital São Paulo* between January and November of 2003 were evaluated. During this period, 73 patients were submitted to tracheostomy in the ICU. All tracheostomies performed during the

study period were conducted in critically ill patients and at the ICU bedside.

We analyzed the data related to age and gender in order to identify surgical complications.

The evolution of the patient was monitored. 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; infection at the incision site; and loss of the tube within the first five days.

We also analyzed the criteria for recommending the procedure, a decision that was always made by the ICU medical staff, without any influence from the surgical team. All operations were performed by surgical residents under the supervision of a thoracic surgeon.

The technique used was that standardized at the facility. The patients were sedated 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 1% lidocaine with no vasoconstrictor was used for local anesthesia. A longitudinal incision was made, and the muscles were spread until the tracheal rings could be seen. The opening in the trachea was made, using a scalpel, in an inverted 'U' shape, and the tube 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.

All operations were performed using an electric scalpel. When additional illumination was required, an auxiliary light source was used.

The study was evaluated and approved by the Ethics in Research Committee of the Institution.

Results

The age of the 73 patients submitted to the procedure ranged from 2 to 84 years (mean,

Table 1 - Evolution of the patients submitted to tracheostomy in the intensive care unit.

Evolution	n (%)
Deaths unrelated to the procedure	46 (63)
Discharge	27 (37)
Deaths related to the procedure	0 (0)
Total	73 (100)

55.2 years). Of those 73 patients, 47 (64.4%) were male, and 26 (35.6%) were female.

The most common indication was prolonged orotracheal intubation (in 56 cases; 76.7%; mean duration, 15.5 days, compared with 15 days for the sample as a whole), followed by the need for bronchial aspiration and respiratory therapy (in 13 cases; 17.8%). In 4 cases (5.5%), the indication was airway protection.

Patient evolution is shown in Table 1. There were no procedure-related deaths, although 46 patients (63%) died of unrelated causes.

In all patients, the procedure was successfully performed in the ICU.

Early complications occurred in 2 patients (2.7%), who presented increased local bleeding, which was controlled using compression, with no need for re-intervention or any other procedure. Both of those patients were on prolonged intubation and had thrombocytopenia. The late complication in our study was infection at the incision site, which occurred in 2 patients (2.7%) and was treated by applying local dressings, without further clinical repercussions. None of the patients presented any of the other complications (subcutaneous emphysema, pneumothorax, pneumomediastinum, false passage during the insertion of the tube, loss of the tube in the first five days, or fistula).

Discussion

When performed early, tracheostomy reduces the time on mechanical ventilation, the length of ICU stay, and the incidence of bronchopneumonia,^(7,8) as well as minimizing laryngeal trauma and facilitating the early re-introduction of feeding.⁽⁹⁾

Various authors have shown an association between early tracheostomy and shorter length

of ICU stay,^(7,8) which also prevents other future complications. Some authors⁽⁸⁾ have reported a procedure-related morbidity of 4%, whereas others⁽¹⁾ have reported that tracheostomy-related morbidity is 9.4% in the operating room and 8.7% in the ICU.

Other authors have also suggested performing the procedure in the ICU as a safe and acceptably cost-effective alternative.^(1,3,4,10) In the present study, we observed only four complications (in 4 patients; 5.4%). Similar to those reported by other researchers,⁽¹⁰⁾ the complications were minor and had minimal repercussions for the patient. Bleeding occurred in patients who had thrombocytopenia and had spent a long time in the ICU. We believe that coagulation profile is an important test prior to the operation. However, most studies do not mention the request for this test prior to the procedure.^(4,7-9,11)

Bleeding and its control constitute a general concern during the procedure. Since bleeding is difficult to quantify, it is typically classified visually, which precludes uniform analysis. Therefore, we only identify its presence, without quantifying it. We know that, in our study, none of the patients required re-intervention or blood transfusion.

There is great concern regarding the possibility of severe infections, since the procedure would not be performed in an appropriate environment. This was not identified in the present study either. The two cases of infection (2.7%), which occurred surrounding the tube and were treated by applying local dressings, were listed as procedure-related complications. However, we have difficulty in determining whether they were related to the technique used and the place where the procedure was performed or were the result of the tracheal infec-

Table 2 - Complications of tracheostomy in various studies.

Authors	Year	n	Locale	Bleeding (%)	Pneumothorax (%)	Loss of the tube (%)
Dugan and Samson ⁽⁶⁾	1963	461	OR	3	1	0.4
Waldron et al. ⁽⁵⁾	1990	150	OR	3.3	0.6	2.6
Upadhyay et al. ⁽¹⁾	1996	159	OR	4.4	1.3	1.3
Stevens and Howard ⁽⁴⁾	1988	47	ICU	2.1	0	0
Hawkins et al. ⁽³⁾	1989	74	ICU	0	0	1.4
Upadhyay et al. ⁽¹⁾	1996	311	ICU	4.2	1.1	1.7
François et al. ⁽¹⁰⁾	2003	86	ICU	4.6	1.2	1.2
Present study	2006	73	ICU	2.7	0	0

OR: operating room; and ICU: intensive care unit.

tion occurring in these patients who had spent a long period in the ICU.

In Table 2, we can see the complications most commonly found in other studies and compare them to those found in our study.

In our study, the procedure was performed in critically ill patients, which can be seen by the high mortality of such patients, that is, 46 patients (63%) died from causes unrelated to the procedure. The absence of procedure-related mortality and the possibility of successfully performing all the interventions in the ICU, even when they are performed by surgeons in training under the supervision of a specialist, show that the difficulties related to the place where the procedure was performed were not significant.

Performing tracheostomy in the ICU prevents patients from being transported, thereby avoiding the consequences of such transport. Many ICU patients have severe injuries and should not be moved unnecessarily, whereas others have venous access catheters (sometimes also receiving vasoactive drugs), drains, or more invasive monitoring that can become displaced. Therefore, transportation can complicate or threaten the lives of such patients.

We believe that performing tracheostomy in the ICU, as long as the complication rate is comparable to that of tracheostomy performed in the operating room, can have advantages, since it prevents patients connected to multiple devices from being moved. It is more agile, since it does not depend on the often busy schedule of the operating room, as well as dispensing with the need for the additional professionals involved in transportation. In this scenario, the procedure can be performed earlier and, possibly, at a lower cost.

We conclude that tracheostomy in the ICU is feasible and presents a low rate of complications, even when performed in critically ill patients and by surgeons in training under the supervision of a specialist. Therefore, in our view, it is possible to state that performing tracheostomy in the ICU is worthwhile.

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