Percutaneous Tracheostomy without Bronchoscopy a Safe Procedure

Abstract
Tracheostomy is a common procedure in ICU, particularly as an approach for weaning from mechanical ventilation. In mid-1980s percutaneous tracheostomy (PCT) was introduced as a less invasive alternative for the standard surgical tracheostomy. A tracheostomy facilitates weaning from mechanical ventilation, in long-term ventilated patients, by improving airway cleaning, better patient comfort and decreasing airway resistance. Prolonged mechanical ventilation has as main complication ventilator-associated pneumonia. In such case early tracheostomy may reduce that complication.

Methods: We analyzed prospectively 104 adult patients mean age of 53 years who underwent PCT at our ICU between 2012 and 2014. Inclusion criteria were: age>18 years and indication for tracheostomy. Exclusion criterion was technical contraindication for PCT. All the PCT were performed at bedside using Ciaglia technique.

Results: 104 patients, reasons for PCT were weaning failures in 82 (78.85%) and airway protection in 22 (21.15%). The most frequently reasons for admission to the ICU were: pneumonia in 25 (24%), sepsis in 19 (18.3%), and drug intoxication in 7 (6.7%). The mean duration of preceding translaryngeal intubation was 9 days. The mean length of ICU stay was 14 days. We observed one complication in one patient; it was a tracheal stenosis. Sixty six patients (63%) died during their stay in the ICU. These deaths were unrelated to the PCT, but related to severe organ dysfunction. Thirty eight patients (36.54%) survived and was discharged from the hospital, 37 was decannulated.

Conclusion: PCT, in our series, was a safe and practical procedure for bedside management of critical patients.

Keywords: Tracheostomy; Percutaneous; Weaning; Mechanical ventilation

Introduction
Tracheostomy is a common procedure in critical care setting, particularly as an approach for weaning from mechanical ventilation after several weaning failures [1].

In 1909, Jackson described the standard surgical tracheostomy and in mid-1980s percutaneous tracheostomy (PCT) was introduced as a less invasive alternative for the standard surgical tracheostomy and over the last decade has gained worldwide acceptance [2, 3].

A tracheostomy facilitates weaning from mechanical ventilation, in long-term ventilated patients, by improving airway suctioning and cleaning, better patient comfort, decreasing airway resistance and work of breathing [1, 4]. Prolonged mechanical ventilation (MV) in intubated patients has as main complications: ventilator-associated pneumonia, side effects related with prolonged sedation and laryngeal injury. In such cases early tracheostomy may reduce these complications [1].

Some complications are related to tracheostomy mostly: bleeding, tracheal stenosis and infection. Several studies have shown that PCT is a safe, practical and fast procedure and it is associated with lower morbidity than standard surgical tracheostomy [5, 6].

Originally PCT was introduced without bronchoscopy, in the following years this approach was added for guiding the tracheal
Weaning failure was characterized for SBT failure (signs of respiratory insufficiency, hemodynamic instability or psychomotor disturbs) or return to MV within 48 h after SBT.

Results

Of the 104 patients enrolled in the study, reasons for PCT were weaning failures in 82 (78.85%) and airway protection in 22 (21.15). The most frequently reasons for admission to the ICU were: pneumonia in 25 patients (24%), sepsis in 19 patients (18.3%) and drug intoxication in 7 (6.7%), Table 1. The mean duration of preceding transitoryneal intubation was 9 days. The mean length of ICU stay was 14 days.

We observed one complication in one patient; it was a tracheal stenosis that was successfully treated by surgery. In our series of 104 patients, there was no bleeding or accidental decannulation and there were no deaths directly related to the procedure.

A total of 66 patients (63%) died during their stay in the ICU. These deaths were unrelated to the PCT, but related to severe organ dysfunction. Of the 66 deaths, shock in 25 (37.9%), multiple organ dysfunction syndrome in 19 (28.8%) and acute respiratory distress syndrome 9 (13.6%) were the most frequent causes.

A total of 38 patients (36.5%) survived and was discharged from the hospital of these 37 was decannulated. In one patient, with severe brain injury after stroke, tracheostomy tube was maintained for airways protection although successfully weaning from mechanical ventilation.

Discussion

Percutaneous tracheostomy was introduced by Ciaglia in 1985 and progressively gained worldwide acceptance mostly at intensive care setting [1, 3]. Today 60% of the tracheostomies performed at ICU are made by percutaneous technique. In relation to the standard surgical tracheostomy, PCT is more practical, faster, bedside technique and associated with fewer complications [1, 7]. In a meta-analysis involving 1212 patients, PCT was associated with lower incidence of hemorrhage, wound infection and death compared with surgical standard tracheostomy [5].

According to literature complications related to PCT are rare, 3%-4% [1, 5, 7]. In our study occurred 1 complication in one patient (0.96%) it was a tracheal stenosis.

Discussion

Percutaneous tracheostomy was introduced by Ciaglia in 1985 and progressively gained worldwide acceptance mostly at intensive care setting [1, 3]. Today 60% of the tracheostomies performed at ICU are made by percutaneous technique. In relation to the standard surgical tracheostomy, PCT is more practical, faster, bedside technique and associated with fewer complications [1, 7]. In a meta-analysis involving 1212 patients, PCT was associated with lower incidence of hemorrhage, wound infection and death compared with surgical standard tracheostomy [5].

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Table 1 Reasons for ICU admission in 104 patients undergoing percutaneous tracheostomy.

<table>
<thead>
<tr>
<th>Reason for ICU admission</th>
<th>No. of Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>25</td>
<td>24.0</td>
</tr>
<tr>
<td>Severe sepsis</td>
<td>19</td>
<td>18.3</td>
</tr>
<tr>
<td>Drug intoxication</td>
<td>7</td>
<td>6.7</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td>Ischaemic stroke</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>Peritonitis</td>
<td>4</td>
<td>3.8</td>
</tr>
<tr>
<td>Asthma</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>Pulmonary contusion</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>27</td>
<td>26.0</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>100</td>
</tr>
</tbody>
</table>

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Bleeding is the most frequent complication associated with PCT, although major bleeding is uncommon [8]. In our series of 104 patients we did not have hemorrhage complication; it is explained by minimal disruption of tissues and the tamponade effect of the tightly fitting tracheostomy tube.

According to a large cohort of 800 patients who underwent PCT, displacement of the tracheal tube occurred in only one patient [7]. Among our patients we didn’t have displacement of tracheal tubes because these were systematically fixed with stitches.

Death related to PCT is a rare event; rates of 0% and 0.35% are described in the literature [1, 7, 8]. In one study of 572 patients, who underwent PCT, occurred 2 deaths related to the procedure due to trachea-innominate fistulae, mortality of 0.35% [8]. In our study there were not deaths directly related to PCT, they were attributed to severe illnesses, mostly sepsis and organs dysfunction.

There is a relationship between PCT learning curve and complications. Morbidity and mortality increase when inexperienced physicians perform PCT. According to a great prospective cohort of 800 patients, more than 5 attempts were considered sufficient to learn how to perform this procedure and were associated with a decrease in perioperative complications [7]. In our series of patients all the PCT were performed by an experienced physician with more than 10 PCT attempted before the study.

Originally Ciaglia introduced PCT without bronchoscopy; posteriorly it was added to guide the physician in performing the procedure. Today the use of bronchoscopy is optional and there is no difference in the rate of complications with and without bronchoscopy [3, 7].

Several studies have shown that PCT facilitates weaning from mechanical ventilation decreasing duration of mechanical ventilation, pneumonia and mortality [1, 3, 9-11]. In our series of patients PCT resulted in 100% successfully weaning from mechanical ventilation and 99% of decannulation. This impressive achievement may be explained by our experienced group in implementing our weaning protocol [12, 13].

In conclusion percutaneous tracheostomy without bronchoscopy, among our series of patients, was a safe and practical procedure and can be considered a routine approach in the bedside management of critical long-term ventilated patients.
References


