Percutaneous Dilatational Tracheostomy

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For decades, the standard technique for tracheostomy was the open, surgical technique. However, during the past 20 years, the use of percutaneous dilatational tracheostomy has been increased and shown to be a feasible and safe procedure in critically ill patients. The purpose of this report is to review the percutaneous dilatational tracheostomy technique, describe the role of bronchoscopy as guidance for the procedure, and identify the available evidences comparing percutaneous dilatational tracheostomy to surgical tracheostomy.

Key Words: Tracheostomy; Surgical Procedures, Minimally Invasive; Critically Illness; Bronchoscopy

Introduction

Tracheostomy (or tracheotomy) has a long history dating back many centuries as it was first depicted on Egyptian pyramid artifacts in 3600 BC. Afterwards, it is considered that this procedure had been acknowledged as a systematic surgical method since Dr. Jackson had established a standard tracheostomy in 1909. Tracheostomy of that time had been used to remove a respiratory obstruction or tracheal foreign materials but due to later development of bronchoscopy and reduction of triggering diseases such as diphtheria, the needs of tracheostomy had been gradually decreased. Nevertheless, in the early 20th century, the number of patients required the mechanical ventilations began to increase in conjunction with the epidemic of paralytic poliomyelitis, the needs of tracheostomy was reconsidered in the treatment of patients. In fact, the most frequently performed tracheostomy was for the airway maintenance of patients being treated with the mechanical ventilation at intensive care unit (ICU).

In the acute setting like ICU, indications for general tracheotomy include 1) failure of weaning from mechanical ventilation, 2) such conditions which need a long-term mechanical ventilation based on neurological disorders, 3) when securing the airway patency is required to maintain proper expectoration of bronchial secretion. Through this method, it is possible to reduce respiratory dead space and the bronchial resistance in terms of respiratory physiology and to make the suction of bronchial secretion and airway maintenance much easier in terms of nursing at ICU as well as it has advantages of mitigating discomforts from orotracheal or nasotracheal intubation in terms of patient.

As tracheostomy had been performed mainly in ICU patients, other alternative surgical procedures were considered that could substitute the existing surgical tracheostomy (ST) which had been implemented in the operation room. In 1985, Dr. Ciaglia as a thoracic surgeon presented the results of successful performance of "percutaneous dilatational tracheostomy" (PDT) in 24 patients by improving the problems of existing standard tracheostomy and at the same time by using Seldinger's technique that has been widely known already and this is still cited as the first report on PDT at the most even
Various Methods of PDT

In fact, there had been other percutaneous tracheostomies with different methods before the method developed by Dr. Ciaglia was introduced, but they are not in current use because of their inappropriateness in terms of the procedure-related easiness and complications (Figure 1).

Ciaglia technique also had undergone modification and variations for several times since its first presentation (Figure 2), for example, in 1996, the same research group had performed this procedure in 254 patients during 10 years by using commercially produced exclusive set (Cook Critical Care Inc., Bloomington, IN, USA), resulting in very encouraging outcomes of major complications in only 4 patients including 1 death.

As a single dilator with hydrophilic coating has been introduced in order to improve any discomforts and complications of the procedure likely to incur from a series of sequential dilatations, the relevant study results are constantly being presented. As a matter of fact, when studied the results of an initial stage German