Registry of the results of percutaneous tracheostomy in critically ill patients; efficacy and complications.

Thesis

For Partial Fulfillment of Master Degree in Critical Care Medicine

Submitted By

Mohammed Nagy Tewfik Al-Tomy

M.B.B.CH.

Under Supervision of

Prof. Dr. Gamal Hamed Ahmed

Professor of Critical Care Medicine

Faculty of Medicine-Cairo University

Dr. Hassan Samir Effat

Assistant professor of Critical Care Medicine

Faculty of Medicine-Cairo University

Dr. Mohammed Hamdy Saleh

Lecturer of Critical Care Medicine

Faculty of Medicine-Cairo University

Faculty of Medicine-Cairo University

2015

حصر نتائج الشق الحنجرى عن طريق الجلد لمرضى الحالات الحرجه "الفاعليه و المضاعفات"

رسالة

توطئة للحصول علي درجة الماجستير في طب الحالات الحرجة

مقدمة من الطبيب

محمد ناجى توفيق التومى

بكالوريوس الطب والجراحة

تحت إشراف

دكتور / جمال حامد احمد

أستاذ طب الحالات الحرجة

كلية طب- جامعة القاهرة

دكتور/حسن سمير عفت

أستاذ مساعد طب الحالات الحرجة

كلية طب- جامعة القاهرة

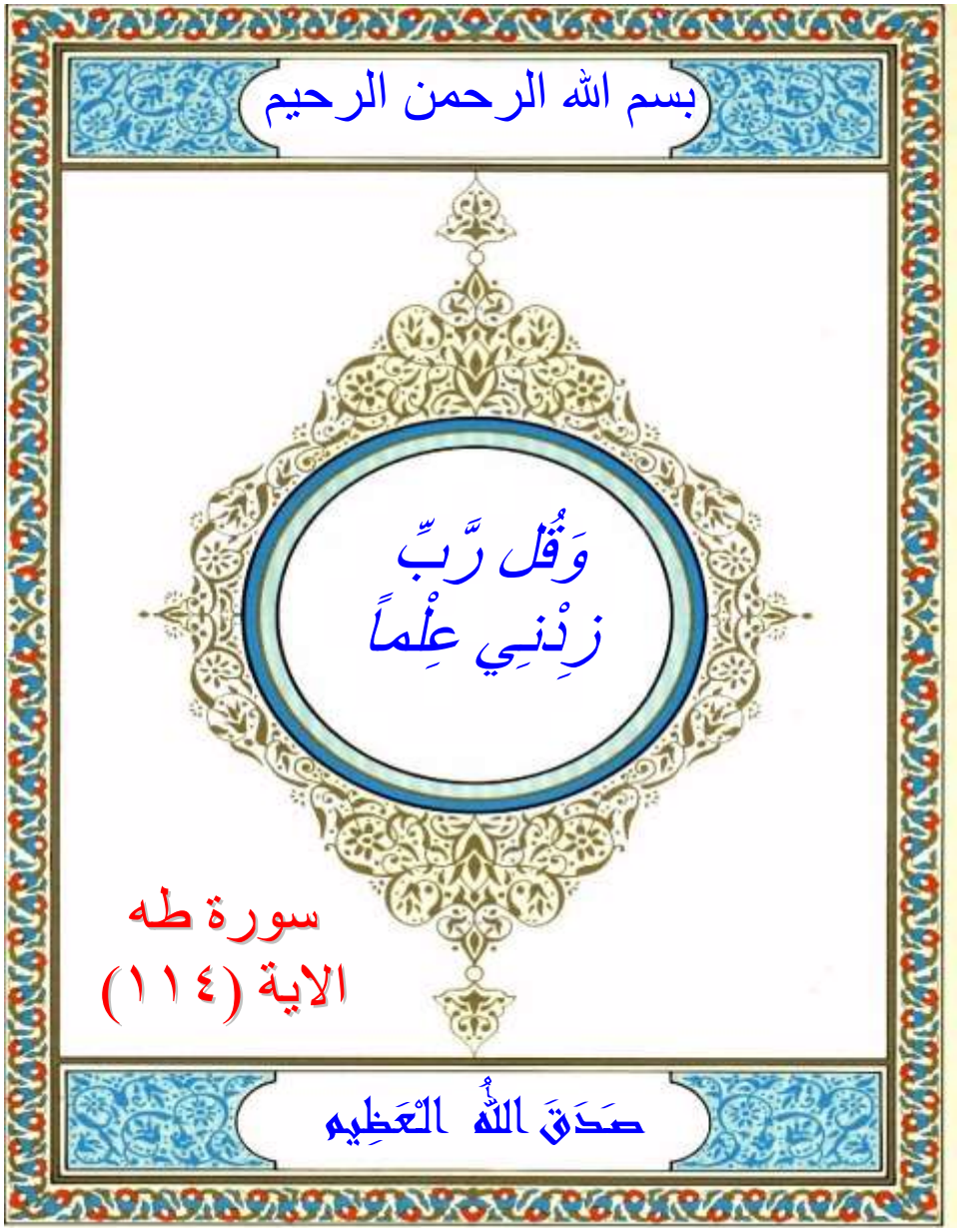
دكتور/ محمد حمدى صالح

مدرس طب الحالات الحرجة

كلية طب- جامعة القاهرة

كلية طب جامعة القاهرة

٢٠١٥


بسم الله الرحمن الرحيم
وَقُل رَّبِّ
زِدْنِي عِلْماً
سورة طه
الاية (١١٤)
صَدَقَ اللهُ العَظِيم

Acknowledgement

First and foremost I thank "ALLAH" to whom I relate any success in achieving any work in my life.

I would like to express my deep appreciation and gratefulness to ***Prof Dr. Gamal Hamed Ahmed,*** Professor of Critical Care Medicine, Faculty of Medicine, Cairo University for his precious help, moral support, fruitful advice and kind attitude. I really have the honor to complete this work under his supervision.

I'm immensely indebted and deeply grateful to ***Dr. Hassan Samir Effat,*** Lecturer of Critical Care Medicine, Faculty of Medicine, Cairo University, for his great encouragement, excellent guidance, powerful support, valuable advices and generous help throughout this work.

Many thanks to ***Dr. Mohammed Hamdy Saleh,*** Lecturer of Critical Care Medicine, Faculty of Medicine, Cairo University, for his kind support, who honestly supervised and precisely revised the whole work that without his contribution, this work would not exist this way.

As well I would like to thank dear ***Dr. Ehab Elghonimy, Dr. Ayman Eltayar*** and ***Dr. Ehab Hegazy*** for their great support to finish such work in our critical care unit in Damanhour Medical National Institute.

Many thanks to My Father's soul, My Mother, My Wife and My beloved girl.

Mohammed al-tomy

List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
ACCP	American College of Chest Physicians.
APACHE II	Acute Physiology and Chronic Health Evaluation II.
ETT	Endotracheal Tube.
E-Tube	Endotracheal Tube.
GCS	Glasgow Coma Score.
ICU	Intensive Care Unit.
ID	Internal Diameter.
LW	Light Wand.
MV	Mechanical Ventilation.
OR	Operation Room.
PCT	Per-Cutaneous Tracheostomy.
PDT	Percutaneous Dilatational Tracheostomy.
PEEP	Positive End-Expiratory Pressure.
RCT	Randomized Controlled Trials.
ST	Surgical Tracheostomy.
TOF	Tracheo-esophogeal fistula.
US	Ultra Sound.
VAP	Ventilator Associated Pneumonia.
WOB	Work Of Breathing

Abstract:

Aims: The blind percutaneous tracheostomy (PCT) technique has significant potential complications. This study aimed to determine whether bronchoscopic guided PCT, has less procedure related complications and better outcome compared to blind method in critically ill patients or not.

Settings and Design: This is a non randomized study was prospectively conducted on eighty one patients who underwent bedside percutaneous tracheostomy at the Critical Care Department at Damanhour Medical National Institute in the period from June 2013 to June 2015.

Methods and Material: 81 patients underwent PCT were included. 34 underwent blind PCT (group A) and 47 underwent bronchoscopic guided PCT (group B). Two groups were compared regarding procedure related complications and outcome.

Statistical analysis used: Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 18 and the following were done.

Results: Overall, complications were higher in group A compared to group B (82.35% vs. 36.17%, p value < 0.05). False passage, pneumothorax, surgical emphysema, and trachea-oesophageal fistula were significantly statistically higher in group A compared to group B (32.4% vs. 0%, 11.8% vs. 0%, 14.7% vs. 0%, and 35.3% vs. 0%, P value 0.0001, 0.016, 0.007, and 0.0001 respectively). Successful weaning and decannulation were significantly higher in group B compared to group A (46.8% vs. 23.5%, and 29.8% vs. 5.9% , p value 0.032 and 0.008 respectively). Although length of ICU stay was lower and survival rate was higher in group B, yet these findings were statistically insignificant.

Conclusions: Bronchoscopic guided PCT has less procedure related complications and better outcome compared to blind method in critically ill patients.

Key-words: percutaneous, tracheostomy, blind, bronchoscopic

Key message: Bronchoscopic guided Percutaneous Tracheostomy has less procedure related complications and better outcome compared to blind method in critically ill patients. We recommend to routinely use flexible bronchoscopy in Percutaneous Tracheostomy performed in critically ill patients.

Introduction

Historical Background

Tracheostomy is not a new medical procedure; it has been reported to have been performed as early as 3600 BC based on Egyptian artifacts.(1) In the 4th century BC, **Alexander the Great** was given credit for saving a soldier's life by using the tip of his sword to create an opening in the neck. **Asclepiades** of Persia is reported to have performed the first formal tracheostomy in 100 BC.(2)

The term 'tracheostomy' was coined by **Lorenz Heister** in 1718, and was associated with trepidation during that period, because safe techniques had not yet been established. **Hippocrates**, in fact, prohibited the performance of tracheostomy for fear of carotid artery laceration and death both from bleeding and infection. There was an increase in awareness of tracheostomy when **George Washington** died of an upper airway obstruction in 1799 and no one had the courage to perform a tracheostomy. This fear was later overcome when the indications, techniques, and instruments were studied in depth in response to the death of **Napoleon Bonaparte**'s nephew as a result of diphtheria in 1807. (2)

The terms tracheotomy and tracheostomy are interchangeable. Derived from the Greek words tracheia arteria (rough artery) and tome (incision), tracheotomy refers to the operation that opens the trachea, while tracheostomy results in the formation of a tracheostoma, or the opening itself.(3)

Introduction

During the nineteenth century, the procedure was considered dangerous and was seldom performed, due to high rate of complications. In 1909 **Chevalier Jackson** described and defined the surgical principles for performing this operation while avoiding most of short- and long-term complications.[4] During this period, the procedure was used to treat difficult cases of respiratory paralysis from poliomyelitis. Largely because of improvements in tubes and advances in clinical care, endotracheal intubation has become the treatment of choice for short-term airway management.[3] The modern surgical technique described by **Chevalier Jackson** in **1909** and has undergone very few modifications since.[4]

Tracheostomy was the prerogative of surgeons and usually performed in the operating room, until recently, but the introduction of "percutaneous dilatational tracheostomy" has moved it into the realms of anesthetists and intensivists. This concept was first introduced by **Sheldon** in **1955** and stimulated by **Toye** and **Weinstein** in **1969** using the **Seldinger** guidewire and it has since been refined with various modifications.[5] Their techniques created a passage using instruments combining dilatation and incision of tissues. Although effective, the procedure fell into disrepute following early complications, notably perforation of the posterior tracheal wall. The introduction by **Ciaglia** in 1985 of the technique using multiple dilators made it possible for anesthetists and intensivists to perform the procedure in the intensive care unit (ICU).[6].

In 1990 **Schachner** [7] described a technique using a device which slides into the trachea over a metal guide wire. When opened, the device resulted in dilatation of the intercartilaginous space allowing placement of a tracheostomy cannula. In the same year, **Griggs** modified a **Howard Kelly** forceps, allowing it to be passed over a guide wire and to be used as a blunt dilator to create a tracheostomy stoma.[8]

In 2002 **Frova et al**. introduced the PercuTwist technique; this technique features a controlled rotating dilation using a single step dilator with a self-tapping screw. To date, little experience has been reported with this technique.[9]

Tracheostomy is one of the most common surgical procedures performed in the ICU and is the airway of choice for patients requiring mechanical ventilation for more than 2 weeks. The exact timing for converting patients to tracheostomy is not entirely clear, so the physician must weight the risks and benefits of tracheostomy versus translaryngeal intubation and estimate the expected duration of mechanical ventilation for each individual patient.[10]

The trachea is easily accessible at the bedside. As such it provides ready access for emergency airway cannulation (e.g., in the setting of acute upper airway obstruction) and for chronic airway access after laryngeal surgery. More commonly, tracheostomy tubes are placed to allow removal of a translaryngeal endotracheal tube. Tracheostomy tubes have an important effect on respiratory physiology.[10]

The most recent and methodological studies indicate that these tubes reduce resistive and elastic work of breathing, when compared to endotracheal tubes. This is a result of tracheostomy tubes lessening inspiratory and expiratory airways resistance and intrinsic positive end-expiratory pressure. Whether these physiologic benefits are of clinical importance in enhancing weaning success remains to be elucidated.[10]

The physician performing the tracheostomy procedure needs to assess each patient to determine the best technique (whether it be performed bedside percutaneously or open in the operating room) for that specific patient. The patient's medical condition, the physician's experience with the various techniques, and the hospital's resources all need to be considered in determining the type of procedure performed.[10]

Most surgeons prefer the operating room (OR) for the formation of tracheostomy. Unfortunately, the risks of transporting critically ill patients from the intensive care unit (ICU) may result in increased morbidity. Moreover, the dependency on surgeons, inability to get (OR) time, and other emergencies may delay elective tracheostomy in patients requiring intensive care.[11]

Aim of the work

The aim of this work is to:

- assess the outcome of percutaneous tracheostomy performed in critically ill patients who get admitted to the critical care department of Damanhour Medical National Institute during the period from June 2013 until June 2015.

- compare the blind versus bronchoscopic guided percutaneous tracheostomy in terms of the detected complications resulting from each procedure during the period of study.