BRONCHOSCOPY GUIDED VS ULTRASOUND GUIDED PERCUTANEOUS TRACHEOSTOMY

THESIS

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Abstract

Introduction: Percutaneous dilatational tracheostomy (PDT) is a widely utilized technique in the intensive care unit as it is a safe and cost effective technique. Bronchoscopy guided percutaneous dilatational tracheostomy has traditionally been used as a safety adjunctive tool in order to define the appropriate site for the tracheal puncture, to guide the real-time entrance of the needle into the trachea, avoiding tracheal posterior wall injuries, and confirming the endotracheal tube placement. By contrast, bronchoscopy might not precisely identify the cervical anatomical structures. Ultrasound has emerged as potentially useful tool in assisting percutaneous dilatational tracheostomy when factors that increase the technical difficulty of the procedure (morbid obesity, difficult anatomy & cervical spine precautions) are present. Several studies have demonstrated the value of pre-procedure cervical ultrasound in order to improve the safety of percutaneous dilatational tracheostomy.

Objectives: This review aims to compare bronchoscopy guided versus ultrasound guided percutaneous tracheostomy in terms of the detected complications resulting from each procedure

Design: A randomized prospective comparative trial.

Setting: Critical care department, Ain Shams university hospital.

Patients: Forty adult patients, requiring elective PDT, and need to maintain a secure airway.

Methods: They were randomly assigned to 2 groups; fiberoptic bronchoscopic PDT group I and Ultrasound guided PDT group II. Both groups used Blue Rhino technique for PDT. Post-operative complications were recorded.

Results: In group I, males were 11(55%) and females were 9(45%) while in group II were 14(70%) and 6(30%) respectively. Age in group I ranged from 37-67 with mean value 52.4±10.89 and in group II ranged from 40-71 with mean value 54.6±9.81. There was one puncture in 19 cases (95%) in group I, while one puncture in 17 cases (85%) in group II. Total time in group I ranged from 3-9 with mean value 5.3±1.69 and in group II ranged from 3-9 with mean value 6.2±1.79. Transient hypoxemia occurs in about 3 cases (15%) in the bronchoscopy guided PDT group in comparison to none in the ultrasound guided PCT group. Bleeding occurred in 2 patients (10%) in bronchoscopy guided PDT group versus one patient (5%) in Ultrasound guided PCT group. Misplacement of the tracheostomy tube was encountered in only two cases (10%) in US guided PDT group and non

in other bronchoscopy guided PDT group, which lead subsequently to pneumothorax in one case (5%).

Conclusion: Percutaneous dilatational tracheostomy is a bedside safe procedure with low rate of complications. US guided PDT and bronchoscopy guided PDT are effective, safe and associated with similar complication rate and clinical outcome. Bronchoscopy guidance during PDT offers the best vision decreasing the need for multiple punctures and the risk of misdirection or false passage of the tube. Ultrasound is a promising less invasive method to guide the percutaneous tracheostomy procedure.

Key Words: fiberoptic bronchoscopic-Ultrasound-percutaneous dilatational Tracheostomy.

References:

Durbin C. "Tracheostomy: why, when and how?" Respiratory Care, 2010;"55, (8), 1056–1068.

Freeman and Morris. "Tracheostomy practice in adults with acute respiratory failure," Critical Care Medicine, 2012; 40: (10), 2890–2896.

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List of abbreviations

ABG	Arterial blood gas
ACCP	the American College of Chest Physicians
BFPT	balloon facilitated percutaneous tracheostomy
CBC	Complete blood count
CBD	Combined balloon dilatation
ECG	Electrocardiogram
ETCO2	End Tidal CO2
ETT	Endotracheal tube
FiO2	Fractional concentration of oxygen in inhaled gas
Fr	French
G	Gauge
GWDF	Guide wire dilating forceps
Hge	Hemorrhage
ICU	Intensive care unit
ID	Internal Diameter.
INR	International normalized ratio
MDT	multiple dilator technique
MAP	mean arterial pressure
PaCO2	Partial pressure of carbon dioxide
PaO2	Partial pressure of oxygen
PEEP	Positive end expiratory pressure
PT	Prothrombin time
aPTT	Activated partial thromboplastin time
PDT	Percutaneous dilatational tracheostomy
SaO2	Arterial oxygen saturation
TLT	Translaryngeal tracheostomy
TOF	Trachea-oesophageal fistula

Introduction

Introduction

Tracheostomy is one of the most frequent procedures performed in critically ill patients. It has been advocated for those requiring prolonged mechanical ventilation because it facilitates weaning by decreasing the work of breathing, decreases the requirement for sedation and may allow for earlier patient mobilization, feeding and physical and occupational therapy. **(Freeman and Morris. 2012).**

Recent studies have suggested that tracheostomy results in fewer oral-labial ulcerations, improves pulmonary toileting, and lowers incidence of pulmonary infections. Furthermore, newer techniques such as percutaneous dilatation tracheostomy (PDT) have been shown to be cost-effective and safe. Tracheostomy, however, is not devoid of risks. Complications may include hemorrhage, stoma infections, pneumothorax, subcutaneous emphysema, tracheal stenosis, tracheomalacia and rarely death. **(Durbin. 2010).**

Percutaneous dilatational tracheostomy (PDT) is a widely utilized technique in the intensive care unit as it is a safe and cost effective technique. Bronchoscopy guided percutaneous dilatational tracheostomy has traditionally been used as a safety adjunctive tool in order to define the appropriate site for the tracheal puncture, to guide the real-time entrance of the needle into the trachea, avoiding tracheal posterior wall injuries, and confirming the endotracheal tube placement. By contrast, bronchoscopy might not precisely identify the cervical anatomical structures and prevent complications linked to local organ lesions such as vascular lesions or thyroid punctures. **(Dennis BM et al., 2013).**

Ultrasound has emerged as potentially useful tool in assisting percutaneous dilatational tracheostomy when factors that increase the technical difficulty of the procedure (morbid obesity, difficult anatomy & cervical spine precautions) are present. Several studies

have demonstrated the value of pre-procedure cervical ultrasound in order to improve the safety of percutaneous dilatational tracheostomy. **(Rajajee V et al., 2015).**

The potential advantages of ultrasound include the ability to identify the cervical vasculature, the size of the thyroid and the tracheal rings, to help identify the most appropriate location for the tracheal puncture site and to guide the needle insertion into the trachea. Unfortunately, ultrasound cannot be used to visualize within the trachea. **(Rajajee V et al., 2015).**

Aim of the Work

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The aim of this work is to compare bronchoscopy guided versus ultrasound guided percutaneous tracheostomy in terms of the detected complications resulting from each procedure during the period of study.

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