A COMPARATIVE STUDY BETWEEN GLIDESCOPE® VIDEOLARYNGOSCOPE AND DIRECT LARYNGOSCOPE USING MODIFIED RAPID SEQUENCE INDUCTION ON HAEMODYNAMIC PARAMETERS DURING INTUBATION

by

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ABBREVIATIONS

LIST OF ABBREVIATIONS

HUSM	-	Hospital University Sains Malaysia
SPSS	-	Statistical Package s for Social Science
DL	-	Direct laryngoscope
GS	-	Glidescope®
i.e.	-	*id est*, that is
et al	-	*et alii*, and others
SBP	-	Systolic blood pressure
DBP	-	Diastolic blood pressure
MAP	-	Mean arterial pressure
HR	-	Heart rate
SpO_2	-	Oxygen saturation

ABSTRACT

ABSTRAK

Pengenalan:

Terdapat banyak kaedah untuk mengintubasi trakea; setiap kaedah menghasilkan kadar perubahan hemodinamik yang berbeza-beza. Laringoskopi menggunakan Glidescope® videolaryngoscope adalah alat laringoskopi yang agak baru diperkenalkan, dikatakan dapat melihat glottis dengan lebih baik tanpa perlu melaraskan ketiga-tiga paksi saluran pernafasan dan dapat mengurangkan manipulasi semasa intubasi. Kajian ini melihat samada teknik Glidescope® videolaryngoscope dapat mengubah tindakbalas saraf simpatetik yang lazimnya berlaku semasa intubasi secara standard.

Objektif:

Membezakan profil hemodinamik (tekanan darah and kelajuan denyutan jantung) di antara proses intubasi menggunakan laringoskopi secara terus dan Glidescope® videolaryngoscope.

Kaedah:

Kajian secara prospektif dan rawak ini melibatkan seramai 64 orang pesakit ASA I dan II yang terbahagi samarata (n=32) kepada dua kumpulan; laringoskopi secara terus dan menggunakan Glidescope®. Bius am diberi menggunakan suntikan intravena fentanil 1.5μg/kg, propofol 2mg/kg dan rocuronium 1mg/kg. Proses laringoskopi dan intubasi dimulakan sekurang-kurangnya seminit selepas

suntikan rocuronium. Tekanan darah tidak invasif dan kelajuan jantung direkodkan sebelum (nilai asas), semasa dan setiap seminit selama lima minit selepas intubasi.

Keputusan:

Masa diambil untuk intubasi menggunakan Glidescope® (mean 35.67±9.59sec) didapati lebih lama berbanding laringoskopi secara terus (mean 20.13±5.03sec), $p<0.001$. Tekanan darah sistolik, diastolik, mean dan kelajuan jantung juga secara signifikannya lebih tinggi berbanding nilai asas dalam kumpulan Glidescope® ($p<0.001$) berbanding kumpulan laringoskopi secara terus.. Kenaikan kelajuan jantung dalam kumpulan Glidescope® ini juga mengambil masa lebih lama iaitu lebih 5 minit untuk kembali ke kadar asas berbanding 3 minit dalam kumpulan laringoskopi secara terus.

Kesimpulan:

Intubasi secara terus menghasilkan parameter hemodinamik yang lebih stabil berbanding Glidescope® videolaryngoscope. Bagaimanapun, kadar kenaikan parameter hemodinamik dalam kumpulan Glidescope® videolaryngoscope yang tidak melebihi 20% daripada nilai asas masih lagi dapat diterima sebagai rawatan standard anestesia.

ABSTRACT

Introduction:

There are different techniques of intubation of trachea apart from standard direct laryngoscopy. Every technique produces sympathetic response in varying degrees. Glidescope® videolaryngoscope, is a relatively new intubating device to improve the glottic view without aligning the three airway axes as done in standard direct laryngoscopy and is said to cause less airway manipulations. Our study is to see if Glidescope® videolaryngoscopic technique would alter the sympathetic response as normally seen in standard laryngoscopy.

Objective:

To assess haemodynamic responses between direct laryngoscopy and Glidescope® videolaryngoscope during laryngoscopy and intubation.

Methodology:

This is a prospective randomized study involving 64 ASA I and II patients divided into 2 groups (n=32); direct laryngoscopy and Glidescope® group. Anaesthesia was induced with intravenous injection of fentanyl 1.5µg/kg, propofol 2mg/kg and rocuronium 1mg/kg. Orotracheal intubation was started at least 1 minute after rocuronium injection. Noninvasive blood pressure (BP), heart rate and oxygen saturation were recorded before (baseline value) and immediately after induction, during intubation, and for 5 minutes later, at one-minute intervals.

Results:

Intubation time was significantly longer in the Glidescope® group (mean 35.67±9.59sec) when compared to direct laryngoscopy group (mean 20.13±5.03sec), $p<0.001$. In the Glidescope® group, the systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate were significantly higher than the direct laryngoscopy group. The increase in heart rate in Glidescope® group took more than 5 minutes to return to baseline values compared to only 3 minutes in direct laryngoscopy group.

Conclusion:

Direct laryngoscopy showed better haemodynamic parameters of mean SBP, DBP, MAP and heart rate compared to Glidescope® videolaryngoscope. However, the increase in haemodynamic parameters in the Glidescope® group was not more than 20% of baseline values and this was still acceptable to our routine standard anaesthetic management.

INTRODUCTION

1. INTRODUCTION TO THE STUDY

Laryngoscopy and intubation are known to cause hypertension and tachycardia due to reflex sympathetic stimulation. The magnitude of the pressor response is related to the duration of laryngoscopy and may be severe during a difficult intubation with multiple, prolonged attempts at laryngoscopy and intubation. These responses may be particularly deleterious in patient with hypertension, ischaemic heart disease, and myocardial dysfunction and raised intraocular and intracranial pressure (Divatia, 2005).

Numerous methods have been tried and studied in order to find a better intubating condition especially for susceptible patients either by using drugs or by modifying laryngoscopic and intubating techniques. Kovac (1996) had reviewed the many common methods and techniques that had been reported to significantly attenuate or blunt the haemodynamic changes (heart rate and blood pressure) as a result of induction of anaesthesia and laryngoscopy and endotracheal intubation (LETI). It appeared that maximal increase in blood pressure occured with laryngoscopy and maximal increase in heart rate occured with endotracheal intubation.

This study aims to evaluate the haemodynamic responses between the most commonly used laryngoscopic technique i.e. direct laryngoscopy using the Macintosh blade and the relatively new intubating device, Glidescope videolaryngoscope®.

Macintosh direct laryngoscopy (DL) has commonly been used in assisting orotracheal intubation. Proper positioning of the head and neck to achieve `a line of vision` is almost always necessary in this method to ensure an optimal view of the glottis, however positioning alone does not align the airway axes and force must be applied to achieve it (Cooper, 2004). This most optimal position which aligns the three airway axes (oral, pharyngeal and laryngeal axes) is also called the sniffing position. Recently, an investigation had questioned the sniffing position as the ideal position for tracheal intubation (Adnet *et al*, 2001). Therefore it is assumed that in the attempt to obtain a good laryngeal view with the use of DL for tracheal intubation, airway manipulations need to be done to achieve a position in which a patient may be intubated.

Glidescope® system (Saturn Biomedical Systems, Burnaby, BC, Canada) is a relatively new intubating camera laryngoscope with a small monitor where the image is displayed. It is designed to improve the glottic view as it is able to 'look around the corner'. A number of studies done have established the efficiency of Glidescope system in allowing a view of the glottis without aligning the three airway axes. Due to this advantage, it is anticipated that the Glidescope® could reduce the cardiovascular responses to tracheal intubation.

LITERATURE REVIEW

2. LITERATURE REVIEW

2.1 Direct laryngoscopy and tracheal intubation

A brief history

The evolution of laryngoscopy had taken its time over centuries. In 1829, a medical student, Benjamin Guy Babington invented a "glottiscope" to view the glottis (Bailey B, 1996). And later, a professor of singing at the Royal Academy of Music, Manual Garcia (1805-1906) was generally credited with the discovery of laryngoscopy after he employed a dental mirror to visualize his own larynx and trachea during inspiration and vocalization in combination with a hand-held mirror reflecting sunlight. Turck and Czermak introduced indirect laryngoscope using mirror and lamp into clinical practice and established a laryngology clinic in 1870 in Vienna (Cooper, 2004).

A Berlin physician, Kirstein performed the first direct visual examination of the human larynx on April 23rd, 1895 after he learned from a colleague that a scope used for the oesephagus of a patient had slipped into the trachea (Hirsch *et al*, 1986). He made some alteration to his 'autoscope' device to facilitate its insertion and minimize injury to upper mouth; he was also the first to fully describe the 'sniffing position' used to improve laryngeal view. Chevalier Jackson invented U-shaped laryngoscope in 1913 and in the same year, Janeway developed an L-shaped laryngoscope with a light source powered by batteries in the handle

(Jackson, Janeway, 1913). It was an improvement of the overall design of Kirstein and Chevalier. Years passed on without much development in laryngoscopy.

In 1941, a new, longer, lower profile laryngoscope blade was introduced by Robert Miller, created to pick up the epiglottis (Miller, 1941). Subsequently two years later Robert Macintosh designed a curved blade to elevate the epiglottis by exerting its force on the base of tongue (Macintosh, 1970). Several variations of the Macintosh blade had been made but all were designed to elevate the tongue and epiglottis simultaneously with the distal tip placed in the vallecula (Menges *et al*, 2005). Following these many other methods for viewing the glottis had been developed including Siker laryngoscope, McCoy articulating laryngoscope, flexible fibreoptic bronchoscope, WuScope, Upsherscope and quite recently, Glidescope.

Direct laryngoscopy using the Macintosh blade has been commonplace among anaesthesiologists. It is considered as the primary method of tracheal intubation and is a fundamental resuscitation skill. However direct laryngoscopy was still regarded as uniquely difficult (Levitan *et al*, 2000). Numerous studies showed novice intubators had low initial success rates. In a study of anaesthesia trainees, the mean success rate for the first ten attempts was about 45%, and skill was only gained until 57 attempts (Steward *et al*, 1984). The difficulties in learning was thought to be due to teaching approaches, limited opportunities for practice and restricted visualization by both the trainee and the supervisor (Levitan *et al*, 2000).

In order to properly use the laryngoscope, one should understand its mechanism of usage. Anatomically, the direct laryngoscope consists of a handle and a blade. The handle has a rough surface and held in the hand during use. Power source for the light comes from disposable batteries located inside the handle. One end of the handle is fitted with a hinge pin that fits a slot on the base of the blade which allows for quick-and-easy attachment and detachment. Handles designed to accept blades that have a light bulb have a metallic contact, which completes an electrical circuit when engaged in operating position.

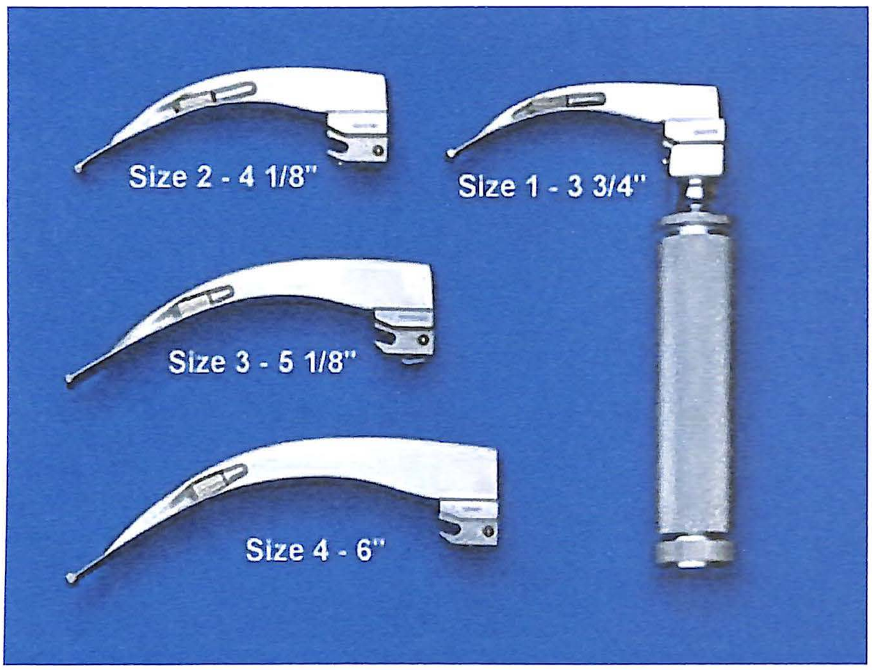

Figure 1: Macintosh blade

The blade is the rigid component that is inserted into the mouth. It is composed of several parts including the base, heel, tongue, flange, web, tip and light source. The base is the part that attaches to the handle whereas the heel is the proximal