Original Article

Hemodynamic response to laryngoscopy in ischemic heart disease: Macintosh blade versus GlideScope® videolaryngoscope

Eisa Bilehjani, Solmaz Fakhari

ABSTRACT

Objective

To determine the hemodynamic response to laryngoscopy/tracheal intubation using GlideScope® videolaryngoscope in patients with ischemic heart diseases.

Methods

In a randomized clinical trial, 80 adult patient, candidate for coronary artery bypass graft surgery were allocated in two groups for laryngoscopy (MC=Macintosh blade or GS=GlideScope). The hemodynamic response, laryngoscopy time, success rate and complication rate were compared.

Results

Two patients were excluded because of long postoperative intubation period. Demographic data and airway characteristics were comparable. There was no failed intubation. Laryngoscopy time in MC group was shorter than GS group (14.50±8.30 versus 48.80±47.82 respectively, p=0.001). Stylet was used commonly and more attempts to intubation were done in GS group. Hemodynamic response to orotracheal intubation in 1, 5 and 15 min following intubation was not different between two groups.

Conclusions

GlideScope® technique did not have any benefit and increased laryngoscopy time, need to use stylet and required more attempts. (Rawal Med J 2009;34:).

Keywords

Tracheal intubation, laryngoscopy, Macintosh blade, GlideScope, ischemic heart disease.

INTRODUCTION

Tracheal intubation is the standard technique of airway management in cardiac surgery. In patients with ischemic heart diseases, hemodynamic response to laryngoscopy and tracheal intubation may have detrimental effects. New videolaryngoscopic systems were designated in purpose to provide a safe and better intubation condition.[1-3] GlideScope® videolaryngoscope is an easy to use laryngoscope. Although it can produce an excellent glottic view,[4] however, along with reducing difficult tracheal intubation, duration of the laryngoscopy may be increased.[5,6] This increased duration of the laryngoscopy can exaggerate hemodynamic response to laryngoscopy. We studied intubation characteristics and hemodynamic response to laryngoscopy and tracheal intubation in patients with ischemic heart disease who were undergoing coronary artery bypass graft surgery (CABG) and compared GlideScope (GS) with direct laryngoscopy with Macintosh blade (MC).

PATIENTS AND METHODS

After approval from the our institutional ethics committee and obtaining written preoperative informed consent, we studied eighty adult patients who were under going

elective CABG in a five month period from July to November 2008. Using online software (http://www.graphpad.com/quickcalcs/randomize1.cfm), patients were randomly allocated to either the MC group (n = 40) or the GS group (n = 40). Patients with renal, hepatic disease, bleeding diathesis, diabetes mellitus, Mallampati score of III-IV or history for a difficult intubation and American Society of Anesthesiologists physical Status IV (ASA class IV) were excluded from the study. An oral diazepam 10 mg the night before surgery and IM morphine sulfate 0.1 $mgkg^{-1}$ plus promethazine 0.5 $mgkg^{-1}$ approximately one hour before surgery were administrated as premedication.

Anesthesia was induced with intravenous injection of midazolam 0.1 $mgkg^{-1}$, fentanyl 5-7 μgkg^{-1}. Peripheral nerve stimulator was calibrated with 50 mA in TOF mode (train of four) and then cisatracurium 0.2 $mgkg^{-1}$ (at 15-20 sec) was injected. When TOF count become zero, tracheal tube was placed orally using direct laryngoscopy by a #3 or #4 Macintosh blade or a GlideScope® videolaryngoscope. Invasive arterial and central venous blood pressure, 5-lead ECG, pulse oximetry, end tidal capnography, rectal temperature and arterial blood gas analysis were performed in all patients. The procedure was considered successful, when tracheal intubation was done in up to two attempts. Hemodynamic changes, Mallampati class, laryngoscopic grade, success rate and number of attempts, stylet using rate, the time required for tracheal intubation (the consumed time from opening of the mouth up to filling of the tube cuff) and intra/post-operative complications was recorded.

SPSS version 11.5 software was used for statistical analyses. Normal distribution of continuous data was tested by Shapiro-Wilk test. Pearson's chi-square tests were applied to compare categorical variables or continuous variables with non-normal distributions. Data differences were considered statistically significant at P valued ≤ 0.05.

RESULTS

Two groups were comparable in demographic characteristics (Table 1). Basic heart rate and basic mean arterial blood pressure were comparable. Hemodynamic changes after anesthesia induction and at 1, 5, 15 minutes were not different between two methods (Fig. 1).

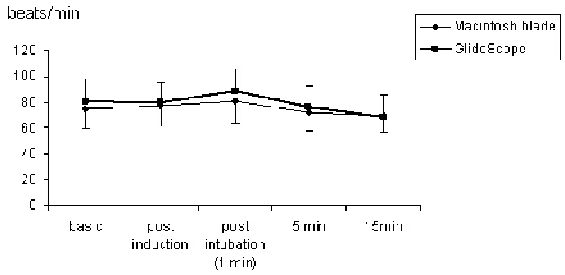
Table 1. Demographic characteristics of two groups.

	MC group (n = 38)	GS group (n = 40)	p
Gender M:F	29/9	23/17	0.078
Age	58.58 ± 10.87	57.28 ± 9.91	0.581
Weight	72.26 ± 15.47	71.45 ± 12.16	0.797
Height	165.47 ± 8.10	163.73 ± 10.15	0.405

Data are mean ± standard deviation or numbers

Airway characteristics (Mallampati class and Laryngoscopy Grade) of two groups were comparable. Although there was no failed intubation case, more attempts (p=0.024) and stylet use (p=0.004) were needed in GS group.

Fig 1. Basic heart rate and its changes at various times in two different laryngoscopic methods.



More than one attempt was needed in 7.9 and 27.5 percent of the patients in MC and GS groups, respectivelyand required time for tracheal intubation significantly longer, p= 0.001 (Table 2).

Table 2. Characteristics of two different laryngoscopic methods.

	MC group (n = 38)	GS group (n = 40)	Total	p
Mallampati class (I/II/III)	25/12/1	21/16/3	46/28/4	0.393
Laryngoscopy Grade (I/II/III/IV)	30/7/1/0	36/4/0/0	66/11/1/0	0.301
Number of attempts	1.08 ± 0.273	1.27 ± 0.452	1.18 ± 0.386	0.024*
one attempt/ two attempts	35/3 (92.1/7.9 %)	29/11 (72.5/27.5 %))	64/14 (82.1/17.9 %)	---
Stylet using rate	3 (7.9%)	14 (35%)	17(21.8%)	0.004*
Time required for intubation (sec)	14.50 ± 8.30	48.80 ± 47.82	32.13±38.563	0.001*

The consumed time from opening of the mouth up to filling the tube cuff.
* Significant differences between two groups

Compilations rate were not different between two groups. The most common complication was sore throat and/or odinophagia (table 3).

Table 3. Complications of two different laryngoscopic methods.

	MC group (n=38)	GS group (n=40)	Total
Bleeding or trauma to lips, teeth and tongue	2	1	0.615
Sore throat/odinophagia	14 (36.8%)	11 (27.5%)	0.261
pneumothorax	1	0	0.487

DISCUSSION

In patients with ischemic heart diseases, hemodynamic response to laryngoscopy and tracheal intubation may have adverse impact on narrow cardiac supply-demand balance. GlideScope® is an easy to use videolaryngoscope and provides an excellent glottic view without alignment of the oral, pharyngeal and tracheal axes that can reduce difficult intubation rates, but laryngoscopy duration is increased. However, in the cases of the difficult tracheal intubations, it improves success rate. The increased duration of the laryngoscopy can increase hemodynamic response. In our study, GlideScope significantly increased needs to use stylet comparing to conventional direct laryngoscopy. This supports the findings that although GlideScope usually provides excellent glottic visualization,[4] but directing an endotracheal tube through the vocal cords is sometimes difficult and more attempts or times.[5,6] may be needed. Studied have showed that the majority of the intubation failures with GlideScope occurred despite a good or an excellent glottic view.[3]

Many methods and kinds of stylet were used to facilitate intubation with GlideScope without any benefits to each others.[7,8] Even if the GlideScope provides an ideal view of the vocal cords, the task remains to navigate the endotracheal tube anteriorly to the location of the larynx, and through the cords, which may be more challenging than simply inserting a tube through a glottis that was exposed by a direct laryngoscope. However GlideScope increased requirement to a stylet from 7.9% up to 35%, we used a standard malleable stylet without any problem. For hemodynamic responses, in our study, there were not any significant differences between GlideScope and Macintosh blade laryngoscopy as reported in previous studies.[9,10]

In our study, GlideScope was significantly more time consuming. We excluded predictably difficult intubation and that all of tracheal intubations performed by experienced anesthesiologists. Thus, GlideScope may be useful in increasing success rate or decreasing duration time, in a specific patient with expected difficult intubation[11,12] or when the operator was inexperienced[13,14] or for teaching laryngoscopy and intubation.[15]

Though serious complications have been reported due to laryngoscopy and tracheal intubation,[16-18] we did not encounter any serious problem. In our study, complication rate were not different between two groups and the most common complication was sore throat or discomfort on swallowing, as reported by others.[10] Limitations of our study include small number, exclusion of difficult airway patients and that all of tracheal intubations were performed by experienced anesthesiologists. In conclusion, to reduce adverse hemodynamic response to orotracheal intubation in the patients with ischemic heart disease, routine use of GlideScope technique had no benefits, and it may increase laryngoscopy time, need to stylet use and more numbers of attempts.

From Department of Cardiovascular Anesthesia, Tabriz University of Medical Sciences, Madani Heart Hospital, Tabriz - Iran.
Correspondance: Eisa Bilehjani MD, Madani Heart Hospital, Daneshqah Street, Tabriz – Iran. E-mail: isa_bilehjani@yahoo.com
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