

Hemodynamic Changes during Orotracheal Intubation with the Glidescope and Direct Laryngoscope

M Mahjoubifar*, Sh Borjian Boroojeny

Clinical Research Development Center, Ali-ebn-Abitaleb Hospital, Zahedan University of Medical Sciences, Zahedan, Iran

Abstract

Background: Hemodynamic changes during intubation are extremely important especially in patients with a history of coronary artery disease and arrhythmia. The aim of this study was to compare the hemodynamic changes during video laryngoscopy (glidescope) and the conventional method of direct laryngoscopy.

Methods: This randomized double-blind clinical trial recruited 200 male patients undergoing elective orthopaedic surgery. Heart Rate (HR) and Mean Arterial Blood Pressure (MABP) were measured before, at the time of induction and every minute for 10 minutes following intubation.

Results: Changes of MABP were significantly less in the glidescope group as compared to direct laryngoscopy group. No significant change was observed between the HR in the two groups.

Conclusion: Glidescopic method of orotracheal intubation is considered advantageous over the conventional method for its less alteration of MABP.

Keywords: Orotracheal intubation; Glidescope; Hemodynamic Changes

Introduction

Hemodynamic changes of patients during induction of anesthesia and intubation, especially in patients with coronary artery disease and arrhythmia, are very important.¹ Direct laryngoscopy is the most widely used method of orotracheal intubation which, at times, could be very difficult, making the situation more obstinate.² Glidescope video laryngoscopy is a new technique in which a digital camera and a source of light are mounted on the end of the blade. It provides a clear view of the larynx during intubation.³ In the recent decades, video techniques are used in different endoscopic methods providing a better anatomical view, delineating anomalies and facilitating team cooperation. This advantage is absent in con-

ventional laryngoscopy, making the cooperation of the assistant more difficult.⁴

Although it is shown in several studies that video laryngoscopy provides a better view of the upper airways, thus facilitating the orotracheal intubation compared to the conventional laryngoscopic method, its hemodynamic effects remain elusive.⁵⁻⁷ The aim of this study was to compare the hemodynamic effects of video laryngoscopy and direct laryngoscopy.

Materials and Methods

This study was a double-blind clinical trial. The procedures and the whole study were approved by the Ethics Committee of Zahedan University of Medical Sciences. Twenty hundred male patients (ASA Class I and II) were divided into two groups, each consisting of 100 patients according to block randomization. The two studied groups underwent glidescope laryngoscopy or conventional laryngoscopy, respectively. The patients were in the age range of 16-60 and had

*Correspondence: Maziar Mahjoubifar, MD, Clinical Research Development Center, Ali-ebn-Abitaleb Hospital, Zahedan University of Medical Sciences, Zahedan, Iran, PO Box: 13185-1678, Tehran, Iran. Tel: +98-21-66439463, Fax: +98-21-66423304, e-mail: swt_f@yahoo.com, m_mahgoobifard@yahoo.com
Received: December 10, 2009 Accepted: March 6, 2010

not received general anesthesia before. They were all admitted for elective orthopedic surgery of the upper or lower limbs while receiving general anesthesia and oro-tracheal intubation.

The patients were matched according to age, time of being NPO, method of anesthesia and the size of oro-tracheal tube. Exclusion criteria were: 1) ASA III and IV, 2) previous history of surgery with oro-tracheal intubation, 3) upper respiratory airway infection and diseases, 4) emergency surgery, 5) failure of intubation on the first try or a procedure taking more than 30 seconds.

After admission to the operating room and re-checking the access to veins, general anesthesia was induced using sodium thiopental 5 mg/kg, fentanyl 2 µg/kg, lidocaine 1 mg/kg and atracurium 0.5 mg/kg. After mask ventilation using 100% Oxygen, the 4th year resident of anesthesiology acquainted with both methods performed the intubation using either the conventional laryngoscopy or video laryngoscopy.

Mean Arterial Blood Pressure (MABP) and Heart Rate (HR) were measured using Hellige (Hellige Instruments, SMU 610, USA). The measurements were recorded by trained research assistants before, at the time of induction and every minute for 10 minutes following intubation. An average of 10 measurements after intubation was used for analysis and comparison. The collected data were analyzed using t-test by SPSS Program version 15 for Windows.

Results

The mean age of the patients in glidescopy and direct laryngoscopy group was 24±10 and 25±9 years, respectively; the difference was not statistically significant.

HR and MABP before intubation were not significantly different between the two groups. After intubation, there was no significant difference in HR between the two groups. No significant difference was found in the mean difference of HR before and after intubation between the two groups [21.42 (median=20, Min=3, Max=67) vs. 21.55 (median=22, Min=-17, Max=42), respectively].

After intubation, MABP increased significantly in direct laryngoscopy group ($p<0.001$) but not in glidescopy group. MABP changes after intubation was 8.3 (median=8, Min=-9, Max=26) in glidescopy group as well as 11.87 (median=11, Min=-2, Max=37) in direct laryngoscopy group. This difference was significant, showing less MABP changes in

glidescopy group compared to direct laryngoscopy group ($p<0.001$).

Discussion

Changes in HR and MABP were prominent during intubation and in the first two minutes following the procedure. Measurements out of the mentioned period were not different from their basal records. Our study enrolled more patients in comparison to others but was selective for cases entering the study from the matching category of orthopedic diseases.

In a study conducted in 2005, a comparison between glidescopy and the conventional method found glidescopy to be efficient during intubation, providing a better view of the larynx, thus facilitating the process. This is more pronounced in patients with difficult intubation due to inconvenient anatomy.⁸ Another study conducted in 2006 found that changes in the light source and increasing the curvature of the blade reduced hemodynamic fluctuations because providing a better view (Airtrag) decreases the rate of manipulations.⁹ An investigation on nasotracheal intubation in 60 patients divided into 3 groups found that the highest rate of hemodynamic changes occur in fiber optic bronchoscopy group. Conventional laryngoscopy is ranked the second, and glidescope creates the least changes in hemodynamic parameters.¹⁰

In a trial performed in China, no significant difference was found in the hemodynamic changes of the 30 glidescopically and 27 conventionally intubated patients while glidescopy took longer to be performed.¹¹ A larger study published in September 2007 in the same country on 91 patients reported a significant increase in HR and blood pressure during oro-tracheal intubation but there is no definite report of alterations in hemodynamic parameters. It is suggested that standard anesthetic regimens can suppress the changes in the blood pressure but clearly it could not decrease the tachycardia induced during the glidescopic method. What this study shares with the previous ones is the ease of intubation and creating a better view in the glidescopic method of patients with difficult intubation.¹² Same hemodynamic changes were found in 56 Chinese patients undergoing oro-tracheal intubation with two methods of glidescopy and fiber optic bronchoscopy in 2006.¹³

Most recent studies have found higher rates of success along with ease and shortness in nasotracheal intubation using the glidescope.^{11,12} Glidescopy

though easier does not decrease the movements which are made to the neck during the procedure.¹³ Although it is generally accepted that glidescopy provides a better view of the larynx and thus facilitates the intubation especially in patients with difficult intubation, no consensus exists on its hemodynamic effects. Some studies show decreased changes in hemodynamic parameters; yet, others prove no difference compared to the conventional method but in any case no study could be found reporting the inferiority of this technique to the conventional method. The

experience of anesthesiologists using different methods is a potential source of controversy in reporting the hemodynamic effects of glidescopy.

Acknowledgements

The authors would like to thank Farzan Institute for Research and Technology for technical assistance.

Conflict of interest: None declared.

References

- 1 Kamalipour H, Joghataie P, Kamali K. Comparing the combination effect of propofol-ketamine and propofol-alfentanil on hemodynamic stability during induction of general anesthesia in the elderly. *Iran Red Crescent Med J* 2009;11:176-180.
- 2 Taregh SH, Katbab MR, Katbab A, H Eghbal, Amini A. Comparison of intraocular pressure and hemodynamic response subsequent to tracheal tube versus laryngeal tube insertion during general anesthesia. *Iran Red Crescent Med J* 2009; 11(1):52-56.
- 3 Mihai R, Blair E, Kay H, Cook TM. A quantitative review and meta-analysis of performance of non-standard laryngoscopes and rigid fiberoptic intubation aids. *Anaesthesia* 2008;63:745-60. [18582261] [doi:10.1111/j.1365-2044.2008.05489.x]
- 4 Sedrakyan A, van der Meulen J, Lewsey J, Treasure T. Video assisted thoracic surgery for treatment of pneumothorax and lung resections: systematic review of randomised clinical trials. *BMJ* 2004;329: 1008. [15385408] [doi:10.1136/bmj.38243.440486.55]
- 5 Xue FS, Li XY, Liu QJ, Liu HP, Yang QY, Xu YC, Liao X, Liu Y. Circulatory responses to nasotracheal intubation: comparison of GlideScope videolaryngoscope and Macintosh direct laryngoscope. *Chin Med J (Engl)* 2008;121:1290-6. [18713550]
- 6 Kim JT, Na HS, Bae JY, Kim DW, Kim HS, Kim CS, Kim SD. GlideScope video laryngoscope: a randomized clinical trial in 203 paediatric patients. *Br J Anaesth* 2008; 101:531-4. [18689807] [doi:10.1093/bja/aen234]
- 7 Jones PM, Armstrong KP, Armstrong PM, Cherry RA, Harle CC, Hoogstra J, Turkstra TP. A comparison of glidescope videolaryngoscopy to direct laryngoscopy for nasotracheal intubation. *Anesth Analg* 2008;107:144-8. [18635480] [doi: 10.1213/ane.0b013e31816d15c9]
- 8 Rai MR, Dering A, Verghese C. The Glidescope system: a clinical assessment of performance. *Anaesthesia* 2005;60:60-4. [15601274] [doi: 10.1111/j.1365-2044.2004.04013.x]
- 9 Maharaj CH, O'Croinin D, Curley G, Harte BH, Laffey JG. A comparison of tracheal intubation using the Airtraq or the Macintosh laryngoscope in routine airway management: A randomised, controlled clinical trial. *Anaesthesia* 2006;61:1093-9. [17042849] [doi:10.1111/j.1365-2044.2006.04819.x]
- 10 Li XY, Xue FS, Sun L, Xu YC, Liu Y, Zhang GH, Li CW, Liu KP, Sun HT. Comparison of hemodynamic responses to nasotracheal intubations with GlideScope videolaryngoscope, Macintosh direct laryngoscope, and fiberoptic bronchoscope. *Zhongguo Yi Xue Ke Xue Yuan Xue Bao* 2007;29:117-23. [17380681]
- 11 Xue FS, Zhang GH, Li XY, Sun HT, Li P, Li CW, Liu KP. Comparison of hemodynamic responses to orotracheal intubation with the GlideScope videolaryngoscope and the Macintosh direct laryngoscope. *J Clin Anesth* 2007;19:245-50. [17572317] [doi:10.1016/j.jclinane.2006.11.004]
- 12 Xue FS, Zhang GH, Liu J, Li XY, Yang QY, Xu YC, Li CW. The clinical assessment of Glidescope in orotracheal intubation under general anesthesia. *Minerva Anesthesiol* 2007;73:451-7. [17660737]
- 13 Xue FS, Zhang GH, Li XY, Sun HT, Li P, Sun HY, Xu YC, Liu Y. Comparison of haemodynamic responses to orotracheal intubation with GlideScope videolaryngoscope and fiberoptic bronchoscope. *Eur J Anaesthesiol* 2006;23:522-6. [16507195] [doi:10.1017/S0265021506000299]