Haemodynamic response to orotracheal intubation: direct laryngoscopy versus fiberoptic bronchoscopy

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ABSTRACT

Background and Objectives: The cardiovascular response to laryngoscopy and endotracheal intubation causes a reflex increase in sympathetic activity that may result in hypertension and tachycardia the extent of reaction is affected by the technique of laryngoscopy and the use of instruments like direct laryngoscope and fiberoptic bronchoscope**.**

This study aimed to compare the hemodynamic responses to orotracheal intubation via fiberoptic bronchoscopy versus direct laryngoscopy in patients under general anesthesia**.**

Methods: Prospectively120 patients American Society of Anesthesiologist Physical status I -Π were collected in Sulaimani Teaching Hospital from the first of May to 31st. July 2008 and categorized into two groups equally. Group A 60 cases intubated by direct laryngoscopy and group B 60 cases intubated by Fiberoptic Bronchoscopy Blood Pressures and Heart Rates were recorded before induction (baseline), immediately after induction, at the time of intubation and every 2 minutes of the operation.

Results: After intubation systolic, diastolic blood pressure and heart rate increased significantly ($p<0.05$) in both groups in compared to post-induction values but there were no significant increase in blood pressure if compared to base line values only significant increase in heart rate

Conclusions: The fiberoptic bronchoscopy had the same hemodynamic responses to orotracheal intubation compared to the direct laryngoscopy.

Key words: Fiberoptic Bronchoscope, direct laryngoscope, orotracheal tube, Hemodynamic measurement.

INTRODUCTION:

Tracheal intubation is placement of the tube into the trachea, whether via oral or nasal route, tracheal intubations was only described in20th centuries [1]. Using an endotracheal tube to secure a patient airway is still the gold standard, Most routine orotracheal or nasotracheal intubations are performed with the help of direct laryngoscope (DLS) that has curved or straight blade, other external adjuncts such as external laryngeal pressure, a bougie, a stylet, or Magill's forceps may be needed [2].

Fiberoptic bronchoscope (FBO) is an endoscope used to visualize the bronchial tree for diagnostic and therapeutic purpose difficult airway management [3]. The fiberoptic bronchoscope can make difficult or impossible tracheal intubations as easy as a routine procedure. Although this instrument has been available for many decades, it has never achieved the popularity it deserved because anesthetists have abandoned it after a few unsuccessful attempts in using it [4]. Fiberoptic bronchoscope is usually performed under topical anesthesia [5]. Facility with this instrument should be developed by practice with patients where no difficulty in intubations is anticipitated rather than making first attempts when problems arise [4]. Tracheal intubation by using a laryngoscope is often associated with an increase in arterial blood pressure

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hypertensive patients [6]. In this study cardiovascular parameter was used to compare haemodyanamic response of orotracheal intubation, direct laryngoscopy compared with fiberoptic bronchoscopy.

PATIENTS AND METHODS:

After local Ethics Committee approval and taking written informed consent from the patients, 120 patient aged between 20-60 years, collected prospectively in Sulaimani Teaching Hospital from first of May to 31st July 2008.in which they divided into two groups: Group A 60 patients intubated by DLS. Group B 60 patients intubated by FOB. All patients were American Society of Anesthesiologists physical status I-II, scheduled for elective general surgerical operation under general anesthesia, those were in need of orotracheal intubation were included in this study and monitored by (MINDAY Patient monitor PM-9000). Systolic (SBPs), diastolic (DBPs) blood Pressures and Heart Rates (HRs) were recorded before induction (baseline), immediately after induction (the postinduction values), at the time of intubation and every 2 minutes of the operation. Patients with history of: airway disease, cardiovascular disease, use of medications known to affect blood pressure and heart rate, gastroesophageal reflux, morbid obesity, known difficult airway were excluded from this study. All patients were fasted overnight and were normothermic. Anesthesia was induced with fentanyl 1 µg/ kg, pancuronium 0.07-0.1 mg/kg and sodium thiopental 4-7 mg/kg (according to sleeping dose) ventilated by 1-2% isofluranein in 100% O2 . The tracheal intubation was started 3 minutes after pancuronium injection either by direct vision using a Macintosh DLS according to the conventional manner which done within 15-30 second or by FOB , a 5-6mm FOB (Pentax FB-15P, Olympus L, F-TP, Japan) was used, on which mounted the tracheal tube size 7-9mm. The FOB passed into the trachea through an oropharyngeal airway, visualized then the tracheal tube was carefully advanced into the trachea and the FOB was withdrawn, the intubation procedure done within 60-90 second. After the successful intubation, patients maintained on intermittent positive pressure ventilation (IPPV) with a 100% O2 and 1-2% isoflurane. Data analyzed statistically using SPSS 13 for window Microsoft the comparisons of data between the two groups were done using independent-sample t test and P value less than 0.05 considered statistically significant.

RESULT:

There were no significant differences in the two groups regarding patient age, gender, height and weight (Tables 1, 2).

After induction of anesthesia, SBPs and DBPs decreased significantly in both groups in comparing to baseline value ($P < 0.05$).

As compared with the post-induction values, the tracheal intubation caused significant increases in SBPs and DBPs. in both FOB (0.002, 0.0001) and DLS (0.001, 0.003) groups respectively (Figure1). SBPs and DBPs increased at the time of intubation as compared to baseline values in both group and P value was in group A (0.1407 , 0.151) and group B(0.8666 , 0.432) respectively and it was statistically not significant ($P>0.05$) (Figure 1).

HRs at intubation and 2 minutes after intubation were significantly higher than the postinduction (P value=0.001 in FOB and P value=0.007 in DLS groups) and baseline (P value=0.001 in FOB and P value=0.007 in DLS groups) values ($P<0.05$) (Figure 1).

There were no significant differences between the two groups A and B in (SBPs , DBPs and HRs) response to tracheal intubation

Table 1: the demographic data of direct laryngoscope group and fiberoptic bronchoscope group, Sex Distribution.

Gender	Frequency	%
male	59	49.2
female	61	50.8
total	120	100.0

Table 2: the demographic data of direct laryngoscope group and fiberoptic bronchoscope group mean of age, body weight, height.

Types	Mean age (years) ± standard deviation	Mean weight (kg) ± standard deviation	Mean height (cm) ± standard deviation
DLS	40.33 ± 12.592	66.48 ± 7.466	164.65 ± 6.844
FOB	38.72 ± 12.314	66.17 ± 8.070	163.63 ± 6.391
Total	39.53 ± 12.428	66.33 ± 7.743	164.14 ± 6.613

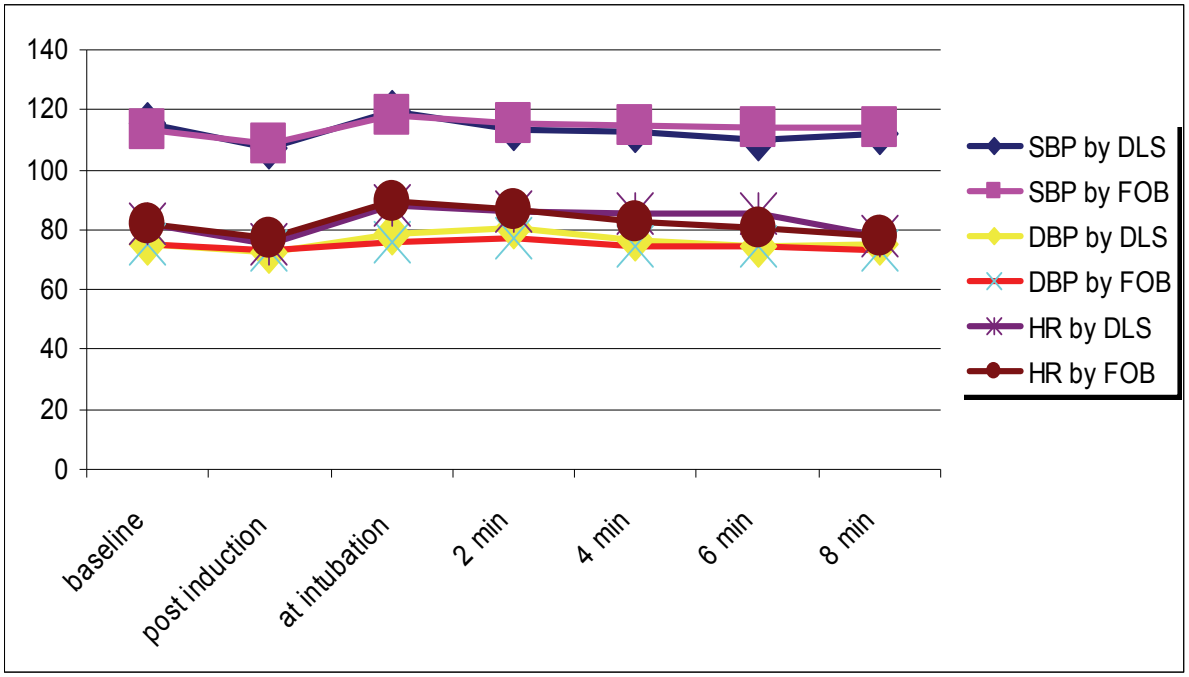

Figure 1: Changes in SBP, DBP, HR associated with the orotracheal intubation using a DLS or a FOB.

DISCUSSION :

The results show that after anesthetic induction, SBPs, DBPs and HRs decreased significantly in both groups, group A and B, in comparisons to the baseline values, the tracheal intubation in both groups, group A and B, caused significant increases in SBPs and DBPs and HRs. But SBPs and DBPs with heart rate in both groups at the time of intubation in comparisons to the baseline value increased but was not statistically significant; this suggests that there are no differences between FOB and DLS in attenuating the cardiovascular response to orotracheal intubation. This is corresponding to those of other studies as; ZHANG Guo-hua, XUE Fu-shan *et al*, who collected 50 patients scheduled for elective plastic surgery under general anesthesia requiring orotracheal intubation demonstrated that the orotracheal intubations using a FOB and a DLS produced similar hemodynamic responses [3]. Michal Barak, Avishai Ziser *et al* did a study on 51 ASA physical status I and II patients who were scheduled for an elective surgery with general anesthesia showed that the use of either direct laryngoscopy or fiberoptic bronchoscopy produced a comparable stress response to tracheal intubation [7]. F. Xue, G. Zhang *et al,* 56 adult patients, ASA I–II scheduled for elective plastic surgery under general anaesthesia requiring orotracheal intubation were randomly allocated to either the direct laryngoscopy group or the fibreoptic bronchoscopy group, shows that the orotracheal intubations using a fibreoptic bronchoscope and direct laryngoscope producd similar haemodynamic responses [8]. C.Prys *et al* found that using fiberoptic intubation produces stimulus to the airway, which invalidates its benefit of avoiding pharyngolaryngeal stimulation. It has been shown that the longer the intubation time the more likely is it to develop hypercapnia, which can result in hypertention and tachycardia [9]. Katsnelson *et al* found that clear passage for the FOB and for the tracheal tube to enter the glottis. In addition, the advancement of the tracheal tube over the FOB is often impeded when the Murphy's tip catches on the downward sagging epiglottis，arytenoid cartilage, vocal cords and anterior tracheal wall. On such occasions, the successful intubation often requires some specific maneuvers e.g. rotating the tracheal tube, further lifting jaw upward and adjusting the patient's head-neck position which can result in hypertention and tachycardia[10]. All these procedures are invasive, and may further stimulate pharyngolaryngeal structures and the trachea. During the fiberoptic intubation, the insertion cord of the FOB must be placed into the trachea for guidance followed by advancing the tracheal tube over the insertion cord into the trachea and then the FOB is removed. This can cause repeated friction and irritation to the trachea. The laryngoscopy produces a balanced stimulation of vagal and cardiac accelerator fibers, whereas the intratracheal manipulation produces less vagal stimulation [11] Tracheal tube insertion itself was the most invasive stimulus and may be the major cause of cardiovascular responses to the tracheal intubation [10, 12, 13.] Rune L., Soren H. *et al,* shows that substantial hemodynamic change was recorded during topical anesthesia and passage of larynx with FOB. During this period, there is marked increase in the heart rate and mean arterial pressure which is more than baseline value[5] , this disagrees the results of this paper as we used general anesthesia and there were no statistically significant increase in BPs and PRs.

CONCLUSION AND RECOMMENDATION

Orotracheal intubations using either FOB or DLS produce similar hemodynamic responses. The FOB had no special advantage in attenuating hemodynamic responses to orotracheal intubation in compared to the DLS. We recommend

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