ORIGINAL ARTICLE

Oral gabapentin reduces hemodynamic response to direct laryngoscopy and tracheal intubation

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ABSTRACT

Background: Laryngoscopy and tracheal intubation increase blood pressure (BP) and heart rate (HR). We studied the effect of gabapentin 800 mg given orally one hour before surgery on hemodynamic responses to laryngoscopy and tracheal intubation.

Methods: Sixty patients were randomly allocated to one of the two groups. Group I received 800 mg of gabapentin and Group II received placebo with sip of water one hour before the induction of anaesthesia. After standard induction technique, study variables, pulse and noninvasive BP (systolic, diastolic and mean) and HR were noted every minute for first five minutes then at 10 and 15 minutes. Relevant demographic data and study variables were recorded.

Results: Mean systolic BP with Gabapentin was lower compared to placebo but it was significant at 1min (136±22vs149±23), 2min (120±21vs136±24), 10min (107±12vs118±16) and 15 min (106±13vs116±13) after intubation (P<0.05). Mean diastolic BP with gabapentin was significantly lower at 3min (69±15vs74±17) after intubation with P<0.05. Mean BP with gabapentin was significantly lower at 2min (91±18vs103±18), 10min (79±12vs88±13) and 15 min (79±14vs86±12) after intubation at P<0.05. Decrease in HR with gabapentin was significant at 10min (92±15vs101±18) and 15 min (87±14vs99±16) after intubation (p<0.05).

Conclusion: Oral gabapentin decreases the response to laryngoscopy and intubation on systolic BP at 2 min and 15 min; mean arterial pressure at 2, 10 and 15 min and HR at 10 and 15 min following laryngoscopy.

Key Words: Gabapentin; pressor response; laryngoscopy; tracheal intubation

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INTRODUCTION

Endotracheal intubation is required for maintenance of the airway and protection against aspiration of the gastric contents[1]. Direct laryngoscopy and intubation result in an increase in BP and HR[2,3], the so called 'pressor response'. Tachycardia and hypertension cause an imbalance in myocardial oxygen demand and supply, predisposing it to ischemia, infarction and heart failure. Patients with preexisting coronary artery disease and underlying cardiac dysfunction are particularly vulnerable to these changes[4]. Patients with uncontrolled hypertension also show exaggerated response to laryngoscopy and intubation. Different pharmacological agents have been used to obtund this response.

Ultra short acting opioids increase the depth of anaesthesia for a short period[5]. The beta blocker esmolol is used

because of its cardioselective adrenergic receptor blocking properties and ultra short duration of action[6,7]. Several studies have assessed the effectiveness of esmolol in blunting the hemodynamic response to laryngoscopy and tracheal intubation.

Recently, gabapentin has been recommended to decrease the cardiovascular response to laryngoscopy and intubation[8]. It was approved in 1994 by FDA for the control of partial seizures with the combination of other antiseizure drugs[9]. In 2002 it was shown to be effective for post herpetic neuralgia[10] and other painful neuropathies [11], and nerve related pains. Originally developed as an anticonvulsant, it is effective in controlling neuropathic pain, to treat acute postoperative pain and reduce postoperative opioid requirements in clinical trials. We planned to evaluate gabapentin for attenuation of response in BP and HR on direct laryngoscopy and tracheal intubation in normotensive patients undergoing elective surgery.

METHODOLOGY

The study was conducted at Department of Anaesthesia, Hameed Latif Hospital Lahore, from May 2007 to July 2008. After obtaining approval from hospital ethical committee, 60 American Society of Anaesthesiologists class I and II. adult patients, planned for elective surgery were randomly allocated either to gabapentin group or control group. Pregnant patients, known hypertensive and ischemic heart disease patients were excluded from the study. The patients in extremes of age were also excluded.

Patient's demographic data e.g. age, sex, weight, diagnosis and the surgical procedures were noted. Group I patients received 800 mg oral gabapentin, while Group II patients received placebo capsules one hour prior to surgery in the pre operative area. All patients received inj. nalbuphine 0.1 mg/kg approximately 5 minutes before intubation. Induction of general anaesthesia was done with inj. thiopentone sodium 5 mg/kg and inj. rocuronium 0.6mg/kg. Patients were ventilated with facemask and bag for 3 minutes and then intubated after direct laryngoscopy by a trained anaesthetist. HR, systolic, diastolic and mean arterial BPs were recorded just before intubation as a baseline and then 1, 2, 3, 4, 5, 10 and 15 minutes after intubation. Data was collected on a specified proforma and analyzed by computer with software SPSS version 11. Independent variables were gabapentin and placebo while dependent variables were HR, systolic, diastolic and mean arterial BP.

Descriptive statistics were calculated. The ratio between genders was described in percentages while age was described as mean and standard deviation. Mean HR, systolic, diastolic and mean BPs were compared by using paired 't' test. $P < 0.05$ was considered as significant.

RESULTS

The demographic data was comparable between the groups. There was no statistical difference in gender distribution or mean age between two groups (Table 1&2)

Table 1: Gender distribution of the subjects under study [N(%)]

Gender	Study groups		Total
	Gabapentin	Placebo	
Male	17(57.7)	19(63.3)	36(60)
Female	13(43.33)	11(36.67)	24(40)
Total	30(100)	30(100)	60(100)

Table 2: Comparison of mean age of the subjects (in years)

Study groups	N	Mean±SD
Gabapentin	30	37±12
Placebo	30	36±14

Statistical Analysis: t =0.246 P = 0.8 (P>0.05)
There was no statistically significant difference of mean age between two study groups

The patients in gabapentin group as compared to placebo group, showed lower Mean HR but it was statistically significant only at 10 and 15 min after intubation as p value was <0.05 only at these time intervals (Fig 1). Mean systolic BP with gabapentin was lower compared to placebo but it was significant at 1,2,10 and 15 minute after intubation ($P<0.05$). Mean diastolic BP in gabapentin group was significantly lower at 3-minute after intubation with $P=0.05$. Mean arterial BP with gabapentin was significantly lower at 2, 10 and 15 minute after intubation ($P=0.05$)(Fig 2).

DISCUSSION

The results of our study suggest that there was a generalized trend towards less haemodynamic response in the gabapentin group as compared to the placebo group but it gained statistical significance only at some specific points

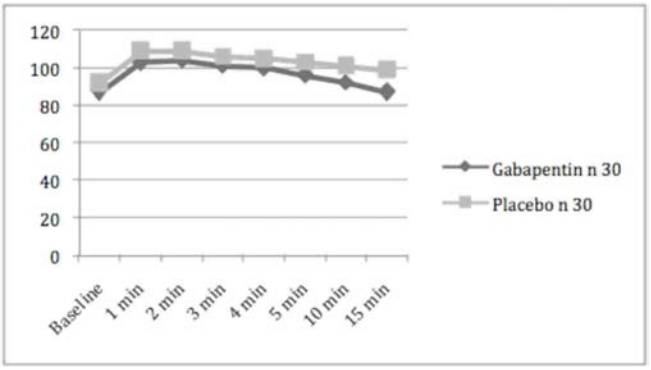

Fig 1: Comparison of HRs before and after laryngoscopy and intubation in two groups

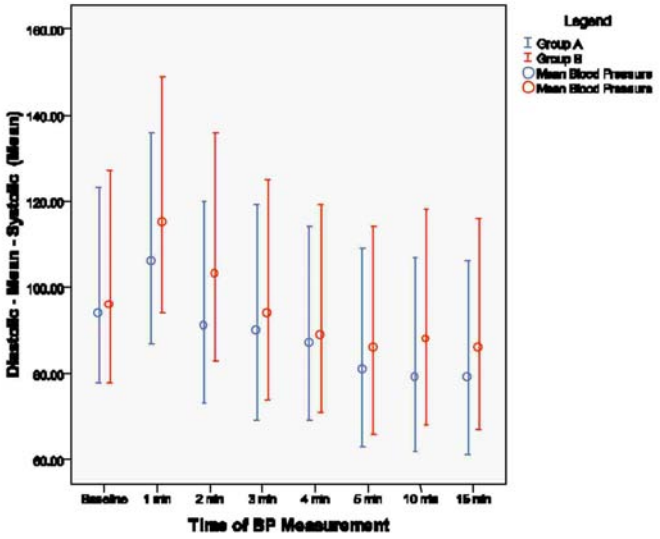

Fig 2: Comparison of systolic, diastolic and mean BPs in two groups

Originally gabapentin was introduced as an anti-epileptic drug. It has also been used as a useful adjunct in the treatment of chronic pain syndromes[12,13]. These studies observed an analgesic effect of gabapentin but they did not realize its hemodynamic effects. The data on this subject is, therefore, limited. Fassoulaki and his colleagues studied the effect of gabapentin on pressor response to direct laryngoscopy and tracheal intubation.[14] They used 1600 mg of gabapentin to one group and placebo capsule to the other group, starting the day before surgery at 6 hours intervals and showed that gabapentin group had less cardiovascular response at all the observed intervals as compared to the placebo group. While in our study, systolic BP was noted to be significantly low at 1, 2, 10 and 15min, but not at 3, 4 and 5 min. The difference in results could be explained by different dosing regimes. Shashi Kiran and Deepak Verma conducted a similar study[15]. Their patients received gabapentin or placebo the night before and on the morning of surgery. Mean systolic BP was significantly lower in the gabapentin group as compared to the control group at 0, 1, 3, 5 and 10 min after intubation; whereas , lower diastolic and mean BPs were noted at 0, 1, 3, and 5 min after intubation. HR was lower in the gabapentin group 0, 1 and 3 min after intubation. The results of our study were similar to this study, as they had used the same strength of gabapentin as we used i.e. 800 mg.

D. Memis et al compared the effects of gabapentin on arterial pressure and HR at induction of anaesthesia and tracheal intubation[16]. Patients receiving placebo (Group I) and 400 mg gabapentin (Group II) showed a significant increase in BP and HR associated with tracheal intubation compared to baseline levels and Group III (patients receiving 800mg gabapentin). The results of our study were same as the group receiving 800 mg gabapentin. Moreover this study also showed that 400 mg dose of gabapentin was not sufficient to blunt the cardio vascular response to tracheal intubation.

There is yet an undocumented but strong observation that the population in our part of the world is very sensitive to the sedative effects of gabapentin. A consistent attenuation of hemodynamic response could therefore, be achieved with a higher dose at the cost of excessive sedation. Postoperative sedation caused by gabapentin was not measured, which is one of the limitations of this study. We used only a single dose pre-operatively in all patients. This would result in lower plasma levels in our patients at the time of laryngoscopy and intubation as compared to other studies employing dosing spread over two days. Gabapentin in combination with dexamethasone has been found to provide much stable hemodynamic profile than gabapentin used alone[17]; this combination could be studied for the sedative effects with low doses of gabapentin.

CONCLUSION

In conclusion, gabapentin attenuates the presser response to laryngoscopy and intubation but this effect is statistically significant only at some specific time intervals. Further studies are needed to find out the optimum dose with or without an adjunct.

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