RESEARCH ARTICLE

Effect of gabapentin on pressor response to laryngoscopy and tracheal intubation in patients undergoing elective cholecystectomy

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ABSTRACT

Background: Laryngoscopy and tracheal intubation trigger sympathetic activity, increasing heart rate (HR) and blood pressure. Various approaches have been tried to reduce the pressor response. Aims and Objectives: The main objective of this study was to assess the effect of gabapentin on pressor response in patients undergoing elective cholecystectomy. Materials and Methods: Patients with ASA grades 1 and 2 who were diagnosed with uncomplicated gall bladder stones on ultrasound in the age group of 18–60 years were randomly allocated into two groups. Group G received gabapentin 600mg orally, and group P received a matching placebo orally 2 h before surgery. Anesthesia was induced by propofol (2 mg/kg) and fentanyl (3 μg/kg). Intubation was facilitated with vecuronium bromide (800 μg/kg). The patient’s HR, systolic blood pressure, diastolic blood pressure, and mean blood pressure were monitored just before (0 min) and after 1, 3, 5, and 10 min of endotracheal intubation. Results: The demographic data of patients were similar in both groups. The mean age was 46.95 ± 6.50 and 49.20 ± 6.38 in the gabapentin group and placebo group, respectively. When compared to the placebo group, the gabapentin group showed significantly lower systolic, diastolic, and mean arterial pressure at 1, 3, 5, and 10 min after intubation. Conclusion: Gabapentin reduced systolic, diastolic, and mean arterial pressure after intubation in patients undergoing elective cholecystectomy.

KEY WORDS: Pressor Response; Endotracheal Intubation; Gabapentin

INTRODUCTION

Rowbotham and Magill in 1921[1] illustrated endotracheal intubation as an essential part of general anesthesia. King et al.[2] first supposed the reflex responses to endotracheal intubation, which include hypertension, tachycardia, and dysrhythmia.[3] These effects have little impact on healthy individuals but have a deleterious impact on cardiac and other diseased patients. Laryngoscopy and tracheal intubation are also required for diagnostic laryngoscopy and fiberoptic bronchoscopy to prevent aspiration. All these procedures trigger sympathetic activity with an increase in adrenaline, noradrenaline and consistent rise in noradrenaline increase heart rate (HR) and blood pressure. Various approaches, including deepening of anesthesia,[2] lidocaine spray,[4] sodium nitroprusside,[5] alpha blockers,[6] nitroglycerine ointment,[7] and oral clonidine[8] tried to reduce the pressor response. Each procedure and medication has variable efficacy and inconsistent outcomes. As every technique has its disadvantages, not a single approach has gained widespread acceptance.

Gabapentin prevents partial seizures and generalized tonic-clonic seizures.[9] It is also effective in reducing neuropathic pain. In many pain models, gabapentin cured allodynia
and hyperalgesia in animal experiments. Many clinical trials were conducted with gabapentin in treating post-operative pain and post-operative opioid requirement. In these studies, patients were hemodynamically stable on gabapentin.

The second-generation anticonvulsant Gabapentin is effective in reducing hemodynamic response to endotracheal intubation. Fassouli et al. demonstrated a reduction in systolic and diastolic blood pressure (DBP) with four divided doses of 1600 mg of gabapentin when compared to placebo without change in HR. In a study by Misra et al., hemodynamic response was reduced with 900 mg of Gabapentin, whereas in Memis et al. study, blood pressure rise was seen with 400 mg of gabapentin and there was a reduction in mean arterial pressure and HR.

Hence this study was conducted to evaluate the efficacy of gabapentin on pressor response to laryngoscopy and tracheal intubation.

MATERIALS AND METHODS

The study was conducted as a prospective, double-blind randomized study at Government General Hospital, Guntur, on patients undergoing elective laparoscopic cholecystectomy. Prior permission and approval from the ethical committee and written informed consent from the study participants were taken. 18–60-years-old patients with ASA grade 1 and 2 uncomplicated gall bladder stones on ultrasound were included in the study. Patients with ASA grade 3 or 4, with predicted difficulty in intubation, gastrointestinal reflux disease, and those who are on antihypertensives, sedatives, and antidepressants are omitted from the study. Forty patients were randomized into the gabapentin group and the placebo group using a random number table. Gabapentin 600 mg orally 2 h before surgery was given to Group G, and a matching placebo was given to Group P. Both groups received Propofol (2 mg/kg) and Fentanyl (3 μg/kg) for induction and vecuronium bromide (800 μg/kg) for intubation. Baseline readings (0 min) of HR, systolic blood pressure (SBP), DBP, and mean blood pressure (MBP) were recorded after 1, 2, 5, and 10 min of endotracheal intubation were taken. Isoflurane (1%) and 70% nitrous oxide with oxygen were given to maintain anesthesia, and reversal was done with atropine 0.02 mg/kg and neostigmine 0.04 mg/kg after surgery.

Statistics

Data entered in Microsoft Excel. Results were expressed as mean ± SD. The demographic data of two groups were analyzed with the Chi-square test. An unpaired t-test was done for the inter-group comparison of SBP, DBP, MBP, and HR. P < 0.05 was taken as significant.

RESULTS

Table 1 shows demographic data for study participants, including gender, age, height, weight, and ASA status. The mean age was 46.95 ± 6.50 and 49.20 ± 6.38 in group G and group P, respectively. The majority belong to the 51–55 age group; the minimum was 56–60 years in Group G, whereas in Group P it was 41–45 years. The mean height was 161.45 ± 6.82 in group G and 163.80 ± 7.67 in group P. The mean weight was 55.80 ± 8.14 and 54.45 ± 6.18 in groups G and P, respectively.

HR in both groups is given in Table 2. There is no change in the HR; the P-value is more than 0.05. There was a significant difference in SBP in the two groups during intraoperative findings at 1, 3, 5, and 10 min, with a P = 0.0001 [Table 3]. DBP at intraoperative and at 1, 3, 5, and 10 min was found to be significant in the groups with P = 0.0004, 0.0001, respectively [Table 4]. MBP at intraoperative and at 1, 3, 5, and 10 min was significant between the two groups of patients with P = 0.0001 [Table 5].

DISCUSSION

Endotracheal intubation plays a vital role in anesthetic practice for good patient care. The rise in catecholamines alters the cardiovascular responses to laryngoscopy and tracheal intubation. Shribman et al. demonstrated a rise in HR and an increase in arterial pressure and catecholamine’s levels with laryngoscopy alone or in combination with tracheal intubation. Even a minor change in hemodynamic response ends in major complications, particularly in high-risk individuals. Various agents, like anesthetics and vasodilators, were tried to reduce this response.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group G (n=20)</th>
<th>Group P (n=20)</th>
<th>P-value</th>
</tr>
</thead>
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<tr>
<td>Age (years)</td>
<td>46.95±6.50</td>
<td>49.20±6.38</td>
<td>0.87</td>
</tr>
<tr>
<td>Gender (male: female)</td>
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<td>8:12</td>
<td>0.74</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.45±6.82</td>
<td>163.80±7.67</td>
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</tr>
<tr>
<td>Weight (kg)</td>
<td>55.80±8.14</td>
<td>54.45±6.18</td>
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<tr>
<td>ASA status (1:2)</td>
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<td>7:13</td>
<td>0.34</td>
</tr>
</tbody>
</table>

ASA: American society of anesthesiologists

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Group P (n=20)</th>
<th>P-value</th>
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<tbody>
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<td>Preoperative</td>
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<tr>
<td>Intraoperative</td>
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<tr>
<td>1 min</td>
<td>97.80±9.74</td>
<td>98.10±11.06</td>
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<tr>
<td>3 min</td>
<td>92.45±8.77</td>
<td>93.30±9.03</td>
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<td>5 min</td>
<td>98.90±8.94</td>
<td>97.85±11.27</td>
<td>0.74</td>
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<tr>
<td>10 min</td>
<td>93.30±11.16</td>
<td>91.90±12.02</td>
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</table>
Pre-treatment with Gabapentin 600 mg 2 h before induction attenuates the pressor response associated with direct laryngoscopy and tracheal intubation in patients undergoing elective cholecystectomy.

REFERENCES


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