EVALUATION OF THE HEMODYNAMIC EFFECT OF INTRAVENOUS LIDOCAINE ON PROPOFOL

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ABSTRACT: Consciousness is a complex state that can be divided into two components, namely, arousal and awareness, with both individually blocked by anesthetic Awareness is the ability to process and store information that can be used to interact with internal or external environment. Aim is to evaluate hemodynamic changes of intravenous lidocaine in reducing requirements of propofol during general anesthesia as monitored by the Bi Spectral Index (BIS). 40 ASA I and II patients posted for elective laparoscopic cholecystectomy were enrolled in the study. study concluded that intravenous lidocaine in the form of bolus followed by infusion reduces the propofol requirements to maintain BIS between 40 and 60, which is required to prevent intraoperative awareness and recall. It also significantly maintains the hemodynamic stability throughout the procedure and reduces the intraoperative angesic requirements in patients undergoing laparoscopic surgeries.

KEYWORDS : lidocaine, propofol, spectral index, hemodynamic effects

1. INTRODUCTION
General anesthesia can be defined as a drug-mediated reversible depression of the central nervous system resulting in the absence of response to and lack of perception of all external stimuli. The various components of anesthesia include unconsciousness, analgesia, amnesia, immobility, and suppression of autonomic responses to noxious stimulation. Consciousness is a complex state that can be divided into two components, namely, arousal and awareness, with both individually blocked by anesthetics. Awareness is the ability to process and store information that can be used to interact with internal or external environment. In contrast, arousal or wakefulness is the state of receptivity to the external environment and is likely mediated through subcortical structures such as the reticular activating system (RAS). An inadequate general anesthesia results in intraoperative awareness with or without recall and the consequent postoperative morbidity. Intraoperative electrophysiological monitoring using Bi Spectral Index (BIS) allows a reproducible, objective and continuous measurement of depth of anesthesia, even during the period when the patient is paralyzed and all reflexes are abolished.[1] BIS monitor consists of a sensing electrode placed on the patient's forehead which reads out the patient's EEG in the form of a non-attributable number in the range of 0 to 100, by means of an integrated custom software. This value helps the anesthesiologist in assessing the conscious state of the patient and in modifying the dose of anesthetic drugs to maintain an adequate depth of anesthesia.[2] Systemic lidocaine infusion has been used in several studies to assess its benefits on the outcome of anesthesia. Having inflammation-modulatory properties, it significantly reduced pain. Similarly, studies have shown that intravenous lidocaine infusion causes a decrease in the minimum alveolar concentration (MAC) of volatile anesthetic agents, thereby decreasing their requirement. There have been some studies postulating the reduction in intravenous anesthetic requirements by using lidocaine infusion. This study aims at evaluating hemodynamic changes of intravenous lidocaine in reducing requirements of propofol during general anesthesia as monitored by the Bi Spectral Index (BIS).

2. AIMS
Evaluation hemodynamic changes of intravenous lidocaine in reducing requirements of propofol during general anesthesia as monitored by the Bi Spectral Index (BIS).

3. METHODS AND MATERIALS
After obtaining institutional ethical committee approval, an informed written consent was obtained from all the patients participating in the study. 40 ASA I and II patients posted for elective laparoscopic cholecystectomy were enrolled in the study.

EXCLUSION CRITERIA
• Age <18 and >60 years
• Unwillingness to participate in the study
• Patients with BMI >35
• Patients with history of allergic reaction to lidocaine
• Patients with history of seizures, drug or alcohol abuse

METHODOLOGY
The patients were randomly allocated into two groups – Group L and Group C.

Independent sample t-test

Separate infusion pumps for either lidocaine or saline prepared by separate staff blinded to the study, were kept ready. After checking the anesthesia machine (Drager workstation), and with all emergency drugs at hand, the procedure was commenced.

All patients were premedicated with Inj. Glycopyrrolate sodium 0.2 mg i.v. 15 minutes prior to surgery. All patients were preoxygenated with 100% oxygen and induced with Inj. Fentanyl citrate 2 µg/kg i.v. and Inj. Thiopentone sodium 5 mg/kg i.v. or till BIS drops to 40, and intubation facilitated with Inj. Succinylcholine 1.5-2 mg/kg i.v. and endotracheal tube of size 8.0-8.5 ID for men and 7.0-7.5 ID for women was used. Intubation stress was attenuated with Inj. Lidocaine 1.5 mg/kg i.v in Group L. Saline was used in Group C.

Following intubation, anesthesia was maintained with N2O:O2 at 2:1 and propofol infusion at 50-150 µg/kg/min, which was titrated to maintain the BIS value between 40 and 60. Infusion of lignocaine was started at 2 mg/kg/hr in Group L and in Group C, saline infusion was started.

The patients were put on ventilator – controlled mode with tidal volume of 7-10 ml/kg. Respiratory rate of 12-16/minute according to the patient's respiratory pattern and the level of BIS.
Parameters monitored:
- Pulse rate
- Blood pressure
- SpO2
- BIS
- EtCO2, PEEP of 3-5 cmH2O.

**4. RESULTS AND DISCUSSION**

**TABLE 1: HEART RATE COMPARISON**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>GROUP L MEAN</th>
<th>GROUP L SD</th>
<th>GROUP C MEAN</th>
<th>GROUP C SD</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Pre Op</td>
<td>90.9</td>
<td>8.614</td>
<td>91.6</td>
<td>8.714</td>
<td>0.913</td>
</tr>
<tr>
<td>5 MIN</td>
<td>88.2</td>
<td>8.08</td>
<td>92.86</td>
<td>9.25</td>
<td>0.042</td>
</tr>
<tr>
<td>15 MIN</td>
<td>84.2</td>
<td>5.822</td>
<td>88.1</td>
<td>5.693</td>
<td>0.011</td>
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<tr>
<td>30 MIN</td>
<td>76.6</td>
<td>4.784</td>
<td>76.95</td>
<td>4.43</td>
<td>0.812</td>
</tr>
<tr>
<td>1 HR</td>
<td>76.7</td>
<td>6.342</td>
<td>77.15</td>
<td>6.235</td>
<td>0.94</td>
</tr>
<tr>
<td>1.5 HR</td>
<td>81.15</td>
<td>7.058</td>
<td>81.45</td>
<td>7.073</td>
<td>0.87</td>
</tr>
<tr>
<td>END</td>
<td>76.15</td>
<td>5.344</td>
<td>76.45</td>
<td>5.365</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**FIGURE 1: SEX DISTRIBUTION**

**FIGURE 2: COMPARISON OF SYSTOLIC BP**

**FIGURE 3: COMPARISON DIASTOLIC BP**

**FIGURE 4: COMPARISON OF BIS SCORE**

The two groups, Group L (lignocaine) and Group C (control) were comparable with respect to the demographic data like age, sex, weight. Duration of surgery was also comparable between the two groups. The flow rates were also same throughout the procedure and intraoperatively, the BIS value was maintained between 40 and 60, with average BIS value showing no significance.

The study group was blinded to the investigator, and the hemodynamic parameters like heart rate, blood pressure and SpO2 were monitored. Only the mean heart rate showed a significant fall in the lignocaine group at 5 and 15 minutes after intubation, suggesting the pressor attenuation action of lignocaine. Otherwise, all other hemodynamic variables did not show any statistical difference between the two groups, suggesting that lignocaine does not produce great hemodynamic stability. BI Spectral monitoring system was first introduced for clinical use in October, 1996, to monitor the outcome of anesthetic agents. In 2003, the Food and Drug Administration (FDA) allowed for another clinical indication which states: “Use of BIS monitoring to help guide anesthetic administration may be associated with the reduction of the incidence of awareness with recall in adults during general anesthesia and sedation.”

**5. CONCLUSION**

The parameters monitored the hemodynamic variables, namely heart rate, blood pressure. The intraoperative BIS values were recorded throughout the procedure. The hemodynamic variables did not show significant variation between the two groups, except during the first few minutes after intubation when the heart rate increase to pressor response was significantly reduced in the lignocaine group. Thus, our study concluded that intravenous lignocaine in the form of bolus followed by infusion reduces the propofol requirements to maintain BIS between 40 and 60, which is required to prevent intraoperative awareness and recall. It also significantly maintains the hemodynamic stability throughout the procedure and reduces the intraoperative analgesic requirements in patients undergoing laparoscopic surgeries.
6. REFERENCES