Impact Of Isoproterenol Infusion On BIS Values In Pediatric Patients Undergoing EP Studies

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BACKGROUND

- Isoproterenol is routinely used in electrophysiologic (EP) studies to help identify aberrant pathways.1
- Isoproterenol infusion increases EEG derived Bispectral (BIS) values speculating decreased anesthetic levels in adult patients under general anesthesia (GA).
- An alteration of anesthetic depth may result in patient awareness or can cause movement under anesthesia and has inherent safety risks.

OBJECTIVE

- We sought to study the impact of isoproterenol in pediatric patients on BIS and metabolic parameters under GA.

METHODS

- Retrospective chart review
  - Inclusion Criteria: All patients undergoing EP study in pediatric cath lab under GA (2011-2012)
  - Exclusion Criteria: Patients with missing data, significant arrhythmia or anesthetic interventions 30 mins prior to or during study points.
  - Data Analysis: 29 charts were screened for Hemodynamic, respiratory, BIS & Arterial Blood Gas (ABG) measurements. 20 patients (average age 13 ± 5 yrs) met the above criteria
  - Data Points
    - Baseline-10 minutes prior to start of isoproterenol Infusion- Time when Cardiac Cycle Length reduced by 20% from baseline after start of isoproterenol

Changes in BIS during infusion of Isoproterenol

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Infusion</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>85 ± 17</td>
<td>121 ± 18</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>60 ± 7</td>
<td>58 ± 10</td>
<td>0.2</td>
</tr>
<tr>
<td>ET Sevo (%)</td>
<td>2.5 ± 0.4</td>
<td>2.5 ± 0.4</td>
<td>0.96</td>
</tr>
<tr>
<td>pH</td>
<td>7.5 ± 0.1</td>
<td>7.4 ± 0.1</td>
<td>0.17</td>
</tr>
<tr>
<td>PaCO2</td>
<td>35 ± 6</td>
<td>36 ± 5</td>
<td>0.13</td>
</tr>
<tr>
<td>ETCO2</td>
<td>34 ± 7</td>
<td>37 ± 5</td>
<td>0.05</td>
</tr>
<tr>
<td>BIS</td>
<td>34 ± 8</td>
<td>41 ± 10</td>
<td>0.01</td>
</tr>
</tbody>
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* 2 sample t-test

Discussion

- Isoproterenol, a β receptor sympathetic cardiac stimulant, increased metabolic rate and BIS values in pediatric patients under GA. We observed a 22 % increase in average BIS values from baseline to infusion.
- In patients breathing spontaneously with laryngeal mask airways, we noticed an increase in respiratory effort while in patients mechanically ventilated with endotracheal tubes, we observed an increase in ETCO2.
- This increase in BIS and respiratory effort may suggest isoproterenol’s central presynaptic β effect in stimulating the wake cycle of the reticular activating system.
- We recommend routine use of BIS, close monitoring of ETCO2 and respirations during isoproterenol infusions and tailoring of anesthetics to prevent possible patient awareness and movement especially when lighter planes of anesthesia are used for the conduct of these procedures.

References