AuraGain™ and i-Gel® laryngeal masks in general anesthesia for laparoscopic cholecystectomy

Performance characteristics and effects on hemodynamics

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ABSTRACT

Objectives: To evaluate and compare the performances of new types of supraglottic airway devices (SADs) with endotracheal intubation regarding their ease of insertions, perioperative complications, and effects on hemodynamic parameters and peak airway pressures in laparoscopic cholecystectomy (LC).

Methods: One hundred and fourteen patients with ASA 1-2 physical status scheduled for elective LC were recruited for this prospective randomized controlled trial. The study was completed between January 2016 and January 2017 in Adiyaman University Research and Educational Hospital, Adiyaman, Turkey. The patients were divided into AuraGain™ (Ambu, Ballerup, Denmark) (n=38), i-Gel® (Intersurgical Ltd, UK) (n=35), and endotracheal tube (ETT)(n=32) groups. Ease of insertion, airway pressures, complications, and hemodynamic variables were compared.

Results: The trial was completed with 105 patients. Ease of insertion for SADs which was evaluated with insertion procedure duration, attempts, first insertion success rates, and oropharyngeal leak pressures were similar between the groups. Heart rate, systolic and diastolic arterial pressures, and peak airway pressures were significantly lower in the AuraGain and i-Gel® groups, compared with the ETT, p<0.017.

Conclusion: Both AuraGain and i-Gel® SADs are comparable with ETT used for airway control in general anesthesia for LC, regarding application ease and perioperative complications. Favorable hemodynamic responses to AuraGain and i-Gel® SADs may put them in a better place than ETT.


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Received 6th May 2018. Accepted 26th September 2018.

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The most preferred anesthetic technique in laparoscopic cholecystectomy (LC) is general anesthesia with controlled ventilation, most often via endotracheal tube (ETT). However, during the procedure, high intra-abdominal pressures due to carbon dioxide insufflation may increase the risk of passive gastroesophageal regurgitation and carbon dioxide retention. For these reasons, cuffed ETT is the most preferred technique when considered in terms of safety. The laryngeal mask airway (LMA) is the most preferred technique when considered in terms of safety. The laryngeal mask airway (LMA) is a supraglottic airway device (SAD) developed by Dr Archie Brain, a British anesthesiologist, and it has been in clinical use since 1988. It is used as a convenient alternative to ETT, with easy and atraumatic insertion, as well as minimal somatic and autonomic responses in many clinical conditions. However, SADs have some disadvantages, like limited protection of the airway from gastric contents. The second generation SADs can overcome this issue. One of these is the i-Gel® (Intersurgical Ltd., UK), which is made of medical grade thermoplastic elastomer (styrene ethylenebutadiene styrene) and does not require an inflating cuff. Its design provides a perilaryngeal seal without cuff inflation. In addition, it is easily and rapidly placed, with a reduced risk of pharyngeal tissue compression. Moreover, it has a gastric drainage tube, and it allows the insertion of a gastric tube (maximum 14 Fr) and aspiration of the gastric contents and air. The third-generation SAD is the AuraGain™ (Ambu, Ballerup, Denmark), which has an anatomically curved design. Its design allows a rapid establishment of a safe airway. It also has a gastric drainage tube with a low frictional inner surface; thus, making placement of the tube easier (maximum recommended gastric tube is 14 to 16 Fr).

There have been studies that investigated the performances of ProSeal™ LMA (Intavent Orthofix, Maidenhead, UK) in LC. However, the performances of i-Gel® and AuraGain have not yet been sufficiently investigated. This study aims to evaluate the performances of new types of SADs (AuraGain and i-Gel®) with endotracheal intubation and compare their ease of insertion, airway pressures, and perioperative complications with ETT. In addition, the secondary aim of the study is to characterise their effects on hemodynamic parameters and peak airway pressures.

**Methods.** Approval for this study was received from the Local Ethics Committee (Inonu University Clinical Research Ethics Committee, Malatya; protocol number 2015/178). Following the ClinicalTrials.gov registration with number NCT02925598 and according to the ethical standards of the Declaration of Helsinki, 114 patients with American Society of Anesthesiologists (ASA) 1-2 physical status scheduled for elective LC were recruited for this prospective randomized controlled trial. The closed envelope method was used for the patient assignment, and patients were divided into 3 groups by a blind anesthesia specialist in the premedication unit, namely the AuraGain, i-Gel®, and ETT groups, each with 38 patients. The airway management was determined by a sealed envelope, and the anesthetist in the operating room opened the envelope in which the airway device was determined. Patients who were under the age of 18 or had a history of hiatus hernia, gastroesophageal reflux, body mass index (BMI) >30 kg m⁻² or ASA physical status 3 or over and patients who met the difficult intubation criteria were excluded from the study. Written informed consent was obtained from each patient. All the patients were blinded and premedicated with intravenous (IV) metoclopramide (anti-nausea 10 mg, Onfarma Medical, Samsun, Turkey) and ranitidine (Ulcuran 50 mg, Yavuz Medical, Istanbul, Turkey) 30 minutes prior to the surgical procedure. An 8-hour fasting period was ensured for the patients.

Monitoring was carried out routinely by electrocardiography (ECG), pulse oximetry (peripheral oxygen saturation, SpO₂) and non-invasive blood pressure (NIBP). A Datex-Ohmeda S/5 Avance (General Electric Inc, Madison, WI, USA) was used. Forehead temperature probes were employed to evaluate the patients’ temperature. Following the provision of a safe and effective airway, SADs and ETTs were connected to the breathing system (Primus, Drager, Lubek, Germany). The same anesthesia machine was used to evaluate lung mechanics. Oropharyngeal leak pressures (OLPs) were evaluated by a fixed gas flow of 4 L min⁻¹ and closing the circuit’s adjustable pressure limiting (APL) valve 5 mins after the airway was secured. Then, the highest anesthesia circuit pressure at which the leak around the seal of the SADs had developed was noted and defined as OLP. Throughout the operation, fluid convection heating pads on table tops and air convection heating above the patients were used to maintain the body temperature at 36-36.5°C. Anesthesia was induced with propofol (Propofol 1%, Fresenius® Fresenius Kabi Medicine, Istanbul, Turkey; 2 mg kg⁻¹), fentanyl (Fentanyl 0.05 mg/ml, Johnson and Johnson

**Disclosure.** Authors have no conflict of interests, and the work was not supported or funded by any drug company.
Istanbul, Turkey, 10 mg kg\(^{-1}\)) and rocuronium (Curon\(^{®}\) 50 mg/5 ml Mustafa Nevzat, Istanbul, Turkey; 0.25 mg kg\(^{-1}\)) for the patients in the AuraGain and i-Gel\(^{®}\) groups. The patients received a rocuronium dose of 0.6 mg kg\(^{-1}\) in the ETT group, which is the 2 \(\times\) ED95 dose (the amount of neuromuscular blocking drug required to reduce twitch height by 95%) required for endotracheal intubation.

Anesthesia was maintained with 1 minimal alveolar concentration (MAC) of sevoflurane (Sevorane\(^{®}\), Liquid 100%, Queenborough, UK; 2%) with 40% oxygen in air. Volume-controlled mechanical ventilation was used for all the groups, and the ventilation parameters were set as a tidal volume of 6 ml kg\(^{-1}\), at a rate of 10-12 min\(^{-1}\), and adjusted as required to maintain an end-tidal carbon dioxide (EtCO\(_2\)) of 30-45 mm Hg. The high initial fresh gas flow rate (6 L min\(^{-1}\)) was reduced to 4 L min\(^{-1}\).

Following the initiation of spontaneous breathing in all the groups, neostigmine (Neostigmine, Adeka Samsun, Turkey) (0.04 mg kg\(^{-1}\) IV) was used for antagonizing the neuromuscular blockade. Atropine (Atropine Sulphate, Galen Medical, Istanbul, Turkey, 0.02 mg kg\(^{-1}\) IV) was given to prevent muscarinic side effects. At the end of the operation, inhalation anesthesia was discontinued, and the SADs or ETT was removed.

Postoperative analgesia was provided with tenoxicam (Oksamen 20 mg IV, Mustafa Nevzat, Istanbul, Turkey) and tramadol (Contramal 100 mg, Abdi Ibrahim, Istanbul, Turkey, 10 mg kg\(^{-1}\)).

The appropriate SAD size was chosen according to the manufacturer’s user guidelines and patient’s body weight. A clear water-based gel was used for lubrication, and SADs were placed with the classical recommended technique and followed by an anesthesia specialist. The AuraGain (AuraGain group) and i-Gel\(^{®}\) (i-Gel\(^{®}\) group) were inserted in supine position, with the patient’s head on a standard gel pillow. The insertion was verified with the manual ventilation of the patient and EtCO\(_2\) waveform. A 14- or 16-Fr orogastric drainage tube was placed through the drainage tube of the SADs following lubrication. An endotracheal tube with an 8.5-mm internal diameter (ID) for males and 7.5-mm ID for females was chosen. Following intubation, an orogastric tube was inserted. The orogastric tubes were aspirated and then allowed to drain freely.

In all the groups, the patients’ heart rate (HR), systolic arterial pressure (SAP), diastolic arterial pressure (DAP), SpO\(_2\), EtCO\(_2\), peak airway pressure (Paw) and OLPs were recorded. The measurement periods were determined as follows: preoperatively (T0), following insertion of the airway device (T1), before abdominal carbon dioxide insufflation (T2), just after the insufflation (T3), and every 10 mins after the insufflation (T4-5). Moreover, the insertion procedure duration, insertion attempts, and complications related to the airway devices were recorded.

After the induction of anesthesia and surgical preparation, in the supine position, pneumoperitoneum was created using a Veress needle to 8-10 mm Hg of pressure and maintained at this level. Then, the operating table was positioned such that the patient’s head was 30° from the horizontal line in reverse Trendelenburg position, and the cholecystectomy was performed.

Kolmogorov-Smirnov/Shapiro-Wilk test analytical methods was used to determine whether the variables were normally distributed, also investigations were made by using visual methods (histograms, probability plots). Continuous variables were emitted as mean ± SD and minimum-maximum values, while numbers and percentages were used to define categorical variables in results. To compare all the variables in the 3 groups the Kruskal-Wallis test was used. Furthermore, Mann-Whitney U test was performed for continuous variables. For categorical variables Chi-square/Fisher exact test were carried out to test the significance of pairwise differences using Bonferroni correction to adjust for multiple comparisons. Repeated-measures analysis of variance was used to evaluate the changes in HR, SAP, DAP, Paw, SpO\(_2\), and EtCO\(_2\) by time among the groups. Greenhouse-Geisser correction was provided when the sphericity assumption was disrupted. An overall p-value <0.05 was considered statistically significant. The SPSS statistical software package (SPSS for Windows 15.0, Inc., Chicago, IL, USA) was used for all statistical analyses.

For acquiring 80% power with a 5% type I error, the research need to include 90 patients (30 for each group). This would allow it to achieve level of minimum clinical significance of the group averages with an impact size of 0.3 (f = 0.3).

Results. The study was conducted on 114 patients, of which, 9 did not complete the study (3 in the i-Gel\(^{®}\) and 6 in the ETT groups) due to the conversion to open surgery. Of the recruited patients, 105 completed the study successfully, and the analysis was carried out on them. The AuraGain groups consisted of 38, i-Gel\(^{®}\) 35, and ETT 32 patients. Fifty-six patients were male (53.3%), while the rest were female. The average age of the patients was 45.4 ± 13.7 years.

There was no difference among the 3 groups in terms of age, gender distribution, ASA physical status, anesthesia duration, weight or height. The patients’
demographic data are presented in Table 1.

Insertion procedure duration for SADs for AuraGain, i-Gel® and ETT was insignificant among the groups ($p=0.056$, Table 2). Attempts for insertion for AuraGain, i-Gel®, and ETT groups was not significant among the groups ($p=0.854$, Table 2). The first insertion success rates for the groups AuraGain, i-Gel® and ETT were not statistically significant between the groups ($p=0.876$, Table 2). Oropharyngeal leak pressures were compared between SADs group only, not evaluated in ETT group and OLPs were not statistically significant ($p=0.944$, Table 2). Complications related to the airway devices were similar between the groups, ($p=0.992$, Table 2). One patient in the AuraGain group and one in the i-Gel® group had blood stained SADs observed at the removal. One patient in the ETT group suffered laryngospasm, which was effectively terminated by moderate positive pressure ventilation with 100% O₂. No other complications were encountered. The ease of insertion was carried out according to 2 parameters, the first was the time taken for placement and the second was attempts made for placement. When a SAD was placed under 15 seconds this was classified as straight forward, over 15 seconds was classified as slightly difficult. If the SADs or ETT was not placed at first attempt, it was classified as obviously difficult. There is a significant result among the groups in terms of ease of insertion and in this regard i-Gel® was favorable (Table 2, $p=0.037$).

Heart rate was lower in AuraGain and i-Gel® groups at T1 compared with ETT and the difference was statistically significant ($p<0.017$, Figure 1). And the heart rate alterations were statistically significant among the groups ($p=0.034$, Figure 1).

The SAP and DAP values were lower at T0, T1, and T2 in the AuraGain group, whereas they were lower at T1 and T2 in the i-Gel® group compared with the ETT group. The difference was statistically significant (Figure 2; $p<0.017$).

The patients’ peak airway pressure alteration graph is demonstrated in Figure 3. The airway pressures in the AuraGain and i-Gel® groups were lower compared

### Table 1 - Demographic data of the patients and duration of anesthesia.

<table>
<thead>
<tr>
<th>Demographic data</th>
<th>AuraGain (n=38)</th>
<th>i-Gel® (n=35)</th>
<th>ETT (n=32)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>42.68 ± 14.12</td>
<td>44.86 ± 13.76</td>
<td>49.25 ± 12.49</td>
<td>0.131</td>
</tr>
<tr>
<td>Gender (M/L)</td>
<td>17/21</td>
<td>15/20</td>
<td>17/15</td>
<td>0.436</td>
</tr>
<tr>
<td>ASA (1/2)</td>
<td>20/18</td>
<td>22/13</td>
<td>17/15</td>
<td>0.622</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>163.61 ± 5.41</td>
<td>161.53 ± 5.27</td>
<td>162.11 ± 6.55</td>
<td>0.337</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>69.27 ± 6.92</td>
<td>67.91 ± 10.92</td>
<td>73.10 ± 9.16</td>
<td>0.076</td>
</tr>
<tr>
<td>Duration of anesthesia (min)</td>
<td>50.79 ± 9.69</td>
<td>48.20 ± 11.96</td>
<td>48.97 ± 11.62</td>
<td>0.630</td>
</tr>
</tbody>
</table>

Values are presented as mean ± standard deviation (SD).

AuraGain - AuraGain laryngeal mask, i-Gel® - i-Gel® laryngeal mask, ETT - endotracheal intubation, $p<0.05$.

### Table 2 - Insertion procedure durations, attempts, first attempt success rates, ease of insertion, oropharyngeal leak pressures and complication rates for supraglottic airway devices and endotracheal tube groups.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>AuraGain (n=38)</th>
<th>i-Gel® (n=35)</th>
<th>ETT (n=32)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion procedure duration (sec)</td>
<td>14.92 ± 4.27</td>
<td>12.94 ± 4.60</td>
<td>16.56 ± 7.31</td>
<td>0.056</td>
</tr>
<tr>
<td>Attempts (times)</td>
<td>1.05 ± 0.23</td>
<td>1.09 ± 0.28</td>
<td>1.09 ± 0.39</td>
<td>0.854</td>
</tr>
<tr>
<td>First insertion success rate (%)</td>
<td>38/38 (100)</td>
<td>35/35 (100)</td>
<td>31/32 (96.9)</td>
<td>0.876</td>
</tr>
<tr>
<td>Ease of insertion (%)</td>
<td></td>
<td></td>
<td></td>
<td>0.037*</td>
</tr>
<tr>
<td>Straight forward (15 sec)</td>
<td>19 (50.0)</td>
<td>27 (77.1)</td>
<td>16 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Slightly difficult (&gt;15 sec)</td>
<td>19 (50.0)</td>
<td>8 (22.8)</td>
<td>16 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Obviously difficult (2nd attempt)</td>
<td>-</td>
<td>-</td>
<td>1 (3.1)</td>
<td></td>
</tr>
<tr>
<td>The oropharyngeal leak pressures</td>
<td>24.92 ± 3.56</td>
<td>26.72 ± 4.20</td>
<td>-</td>
<td>0.944</td>
</tr>
<tr>
<td>Complications</td>
<td>1/38</td>
<td>1/32</td>
<td>1/35</td>
<td>0.992</td>
</tr>
</tbody>
</table>

Values are presented as mean ± standard deviation (SD). AuraGain - AuraGain laryngeal mask, i-Gel® - i-Gel® laryngeal mask, ETT - endotracheal intubation, $p<0.05$.
with that of the ETT group, and the difference was
statistically significant for each measurement time,
\( p<0.017 \). There were no differences between the groups
regarding the increase rates of peak airway pressures,
that is, throughout T1-T5. Note that the pressure
recordings were taken after the SAD/ETT placement,
that is, starting from T1.

Peak airway pressure alteration graph of the patients
is demonstrated in Figure 3. The airway pressures in
the AuraGain and i-Gel® groups were lower compared
with the ETT group, and the difference was statistically
significant for each measurement time. There were no
differences between the groups regarding the increase
rates of peak airway pressures (throughout T1-T5). Note that the pressure
recordings were performed after the SAD/ETT placement (starting from T1).

No difference was observed between the groups
regarding SpO2 and EtCO2 levels, but there was a
different T4 SpO2 value between the AuraGain and
i-Gel® groups \( (p=0.03, \text{ Table 3} ) \). Although this was
statistically significant, it was clinically insignificant.

Table 3 shows the peripheral oxygen saturation
and end-tidal carbon dioxide values of the patients.

Discussion. This is the first study to evaluate
the use of AuraGain in LC. The main finding of this
study was that both AuraGain and i-Gel® SADs are as
successful airway devices as endotracheal intubation is
for LC regarding their ease of insertion, first attempt
success rates, OLPs and perioperative complications.
When ease of insertion was evaluated, the i-Gel®
seems favorable overall, but in a detailed examination
of results, first attempt rates of both SADs are more
successful than ETT. Even the placement of AuraGain
and i-Gel® is just over 15 seconds, their first attempt
success rate 100%. Also, the time needed for placement
of i-Gel® is much less than AuraGain and ETT. The
placement of AuraGain takes 2 or 3 secs more than
i-Gel® which can be a result of that i-Gel® does not
need cuff inflation. In overall evaluation median time
taken to placement of devices is the shortest in i-Gel® group, the longest in ETT group but the difference is not significant statistically. In this regard, our finding are compatible with the previous findings.5,6

In laparoscopic surgery, pneumoperitoneum can increase the airway pressure.1 During the insufflation, our patients’ peak airway pressures increased in all the groups, and the difference was significant compared with the basal values. However, the rates of increment were not significantly different between the groups. The peak airway pressures throughout the operation were lower in the patients in whom AuraGain and i-Gel® were used, compared with endotracheal intubation. When the AuraGain and i-Gel® groups were compared regarding their Paws, although there was no significant difference between the groups, we observed that the Paws in the AuraGain group were relatively lower. This may have been related to ID differences of SADs. The AuraGain number 4 LMA has a relatively wider airway tube when compared with i-Gel®. (The AuraGain and i-Gel® IDs are 12.7 and 12.3 mm, respectively). Moreover, AuraGain has an anatomically curved shape and a wider tube, and it is more flexible to fit. In the literature, there were no data comparing i-Gel® and AuraGain, but Jaganattan et al7 compared the Supreme™ and AuraGain LMAs regarding their application ease, time and success rates, gastric tube insertion, fibreoptic grades of view, airway quality and complications in pediatric patients. They suggested that AuraGain was easier to insert, and more importantly, provided stability in the airway because it needs few airway maneuver compared with the Supreme LMA.

During laparoscopic surgeries, the risk of passive regurgitation from the stomach increases due to the gastric insufflation.1 However, previous studies have shown that even the use of classical LMA or ProSeal LMA did not increase the risk of passive regurgitation or gastric aspiration.8 The ‘rule of 15’ was defined to avoid regurgitation while using a SAD for laparoscopic surgeries (Trendelenburg tilt <15 degree; peritoneal insufflation <15 cm H2O; and duration of abdominal insufflation <15 minutes).9 All our insufflations were performed in supine position with an abdominal insufflation pressure of 8-10 mm Hg, and all the procedures were completed in reverse Trendelenburg position. These may be reasons why no aspiration complications were observed in our patients. In concordance with our findings, Park et al10 could not find any difference between SADs and ETTs regarding regurgitation and they did not observe any regurgitation cases in their research. Also, they did not find any difference between several SADs and ETTs, with respect to the rate of insertion success on the first attempt, and insertion time and OLP in patients undergoing laparoscopic surgery. In the perioperative period, the adverse events in the 3 groups were not significantly different. In the ETT group, one patient had laryngospasm following extubation and was treated with positive pressure ventilation with 100% O2. Moreover, one patient in each SAD group had minor soft tissue damage. No complications were observed during the postoperative period. Park et al10 observed the incidences of laryngospasm, cough at removal, dysphagia or dysphonia, sore throat, and hoarseness were higher in the ETT group than in the SADs

Table 3 - Peripheral oxygen saturation and end-tidal carbon dioxide values of the patients.

<table>
<thead>
<tr>
<th></th>
<th>AuraGain (n=38)</th>
<th>i-Gel® (n=35)</th>
<th>ETT (n=32)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SpO₂ (T₀)</td>
<td>99.21 ± 1.12</td>
<td>98.54 ± 1.42</td>
<td>98.78 ± 1.10</td>
<td>0.051</td>
</tr>
<tr>
<td>SpO₂ (T₁)</td>
<td>99.87 ± 0.34</td>
<td>99.83 ± 0.45</td>
<td>99.84 ± 0.37</td>
<td>0.957</td>
</tr>
<tr>
<td>EtCO₂ (T₁)</td>
<td>32.42 ± 3.30</td>
<td>32.14 ± 2.79</td>
<td>31.69 ± 4.18</td>
<td>0.861</td>
</tr>
<tr>
<td>SpO₂ (T₂)</td>
<td>99.66 ± 0.71</td>
<td>99.71 ± 0.62</td>
<td>99.66 ± 0.75</td>
<td>0.983</td>
</tr>
<tr>
<td>EtCO₂ (T₂)</td>
<td>31.00 ± 2.11</td>
<td>31.20 ± 2.64</td>
<td>31.41 ± 3.44</td>
<td>0.818</td>
</tr>
<tr>
<td>SpO₂ (T₃)</td>
<td>99.53 ± 0.80</td>
<td>99.57 ± 0.81</td>
<td>99.53 ± 0.80</td>
<td>0.851</td>
</tr>
<tr>
<td>EtCO₂ (T₃)</td>
<td>31.58 ± 2.06</td>
<td>30.71 ± 2.55</td>
<td>31.94 ± 3.39</td>
<td>0.057</td>
</tr>
<tr>
<td>SpO₂ (T₄)</td>
<td>99.66 ± 0.67</td>
<td>99.17 ± 0.92</td>
<td>99.50 ± 0.67</td>
<td>0.030*</td>
</tr>
<tr>
<td>EtCO₂ (T₄)</td>
<td>33.11 ± 2.18</td>
<td>32.38 ± 3.36</td>
<td>32.09 ± 3.15</td>
<td>0.471</td>
</tr>
<tr>
<td>SpO₂ (T₅)</td>
<td>99.66 ± 0.78</td>
<td>99.56 ± 0.66</td>
<td>99.44 ± 0.76</td>
<td>0.223</td>
</tr>
<tr>
<td>EtCO₂ (T₅)</td>
<td>33.82 ± 2.31</td>
<td>33.26 ± 3.26</td>
<td>32.50 ± 2.62</td>
<td>0.219</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SD.
SpO₂ - peripheral oxygen saturation, EtCO₂ - end-tidal carbon dioxide,
T₀ - time period, preoperatively, T₁ - the time following insertion of the airway device,
T₂ - the time before abdominal carbon dioxide insufflations, T₃ - the time just after the insufflation T₄, T₅ - the times every 10 mins after the insufflation
* p<0.05 (difference between AuraGain and i-Gel®)
group. Other complications showed no evidence of any difference between the SADs and ETT groups. We observed the same complication rates in our groups.

Our secondary outcome was the devices’ effects on hemodynamic responses during the procedure. The results demonstrated that the HR, SAP, and DAP values increased significantly following the insertion of ETT, while there were no clinically important changes in either SAD group. Responses to laryngoscopy and ET intubation are related to increased sympathetic reflex and sympathoadrenal activity. The glossopharyngeal intubation are related to increased sympathetic reflex while there were no clinically important changes in increased significantly following the insertion of ETT, results demonstrated that the HR, SAP, and DAP values hemodynamic responses during the procedure. The observed the same complication rates in our groups. Other complications showed no evidence of coexisting cardio- or cerebrovascular diseases.

A limitation of this research was the different rocuronium dosages. The rocuronium dose applied to the ETT group was the 2 × ED95 dose required for endotracheal intubation. Smaller doses of rocuronium were applied to the AuraGain and i-Gel® groups. This may have affected the patients’ Paws and hemodynamics, but these potential effects were not observed. In addition, in similar studies in the literature, rocuronium was applied with the same doses in each group. However, the reduced doses of muscle relaxants given to the SAD groups may have been an advantage in this research. Another limitation was that the fentanyl dosage may not have been sufficient to prevent hemodynamic changes in the ETT group. Fentanyl at 1 µg kg⁻¹ was used in all groups, but Hosalli et al. compared both 3 µg kg⁻¹ and 5 µg kg⁻¹ of fentanyl to prevent hemodynamic responses; they concluded that both the 3 and 5 µg kg⁻¹ doses prevented a response, but 5 µg kg⁻¹ of fentanyl completely abolished the hemodynamic responses. In this study, larger doses should have been used to prevent hemodynamic responses in the ETT group.

In conclusion, both AuraGain and i-Gel® SADs are comparable to ETT used for airway control in general anaesthesia for LC regarding application ease, insertion duration and perioperative complications. Both SADs are convenient and usable alternatives to ETT and i-Gel® is the easiest one to insert. Favorable hemodynamic responses to AuraGain and i-Gel® SADs may mean that they are superior to ETT.

Acknowledgment. We would like to thank Scribendi for English language editing.

References


