

1 **Comparison of Supreme Laryngeal Mask Airway and ProSeal Laryngeal Mask Airway**  
2 **during Laparoscopic Cholecystectomy**

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4 **Supreme and ProSeal during Cholecystectomy**

5 **Abstract**

6 **Background:** This study compared the safety and efficacy of the Supreme Laryngeal Mask  
7 Airway (S-LMA) with that of the ProSeal-LMA (P-LMA) in laparoscopic cholecystectomy.

8 **Methods:** Sixty adults were randomly allocated. Following anaesthesia induction,  
9 experienced LMA users inserted the airway devices.

10 **Results:** Oropharyngeal leak pressure was similar in groups (S-LMA,  $27.8 \pm 2.9$  cmH<sub>2</sub>O; P-  
11 LMA,  $27.0 \pm 4.7$  cmH<sub>2</sub>O;  $p=0.42$ ) and did not change during the induction of and throughout  
12 pneumoperitoneum. The first attempt success rates were 93% with both S-LMA and P-LMA.  
13 Mean airway device insertion time was significantly shorter with S-LMA than with P-LMA  
14 ( $12.5 \pm 4.1$  seconds versus  $15.6 \pm 6.0$  seconds;  $p=0.02$ ). The first attempt success rates for the  
15 drainage tube insertion were similar (P-LMA, 93 %; S-LMA 100 %); however, drainage tubes  
16 were inserted more quickly with S-LMA than with P-LMA ( $9.0 \pm 3.2$  seconds versus  $14.7 \pm$   
17  $6.6$  seconds;  $p=0.001$ ). In the PACU, vomiting was observed in five patients (three females  
18 and two males) in the S-LMA group and in one female patient in the P-LMA group ( $p=0.10$ ).

19 **Conclusion:** Both airway devices can be used safely in laparoscopic cholecystectomies with  
20 suitable patients and experienced users. However, further studies are required not only for  
21 comparing both airway devices in terms of postoperative nausea and vomiting but also for  
22 yielding definitive results.

23 **Keywords:** Laparoscopic cholecystectomy, supraglottic airway devices, laryngeal mask  
24 airway, proseal, supreme

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## 35 **Introduction**

36           Supraglottic airway devices are currently the most commonly used instruments in  
37 airway management. Some of the newer supraglottic airway devices have been modified to  
38 improve sealing and have separate respiratory and gastrointestinal tracts. One of the most  
39 popular types of airway devices is the Proseal-Laryngeal Mask Airway (P-LMA) device.  
40 Another one is the Supreme Laryngeal Mask Airway (S-LMA) device which was introduced  
41 in 2007. The S-LMA, a disposable airway device, consists of the features of P-LMA,  
42 Fastrach LMA and Unique LMA, with its own gastric drainage channel, fixed curve tube, and  
43 maneuvering handle<sup>1</sup>.

44           There are certain studies that compare the P-LMA and S-LMA. In some of these  
45 studies, in which the oropharyngeal leak pressure (OLP) was used as a reference, the results  
46 of usage of these two airway devices were similar<sup>2,3</sup>. In other studies using the S-LMA device,  
47 the OLP was lower when compared with P-LMA<sup>4,5</sup>. We aimed to compare P-LMA and S-  
48 LMA in terms of safety and efficacy in surgery requiring high seal pressure such as  
49 laparoscopic cholecystectomy. OLP is commonly performed with the LMA to indicate the  
50 degree of airway protection, the feasibility of positive pressure ventilation and success of the  
51 placement of the supraglottic airway device<sup>6</sup>. The primary objective of our study was to  
52 compare the OLP of the S-LMA and P-LMA. The secondary aim of this study was to  
53 compare the efficacy and safety of these two devices with respect to insertion success rates,  
54 insertion times, degree of gastric distension, intra- and post-operative adverse events, and  
55 hemodynamic and respiratory response to pneumoperitoneum.

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## 57 **Methods**

### 58 Patient Selection

59           After institutional ethics committee approval regarding the study and written informed  
60 consents of all the patients were obtained, 60 adult patients (age range, 18-70 years) with  
61 ASA I or II, undergoing elective laparoscopic cholecystectomy were randomly and  
62 prospectively assigned to have either P-LMA (n=30, The Laryngeal Mask Co. Limited, Mahe,  
63 Seychelles) or S-LMA (n=30, The Laryngeal Mask Company, Singapore) for airway  
64 management. Randomisation was performed using a sealed envelope method. Patients who  
65 had an interdental gap <2.5 cm, and those with a BMI >35 kg.m<sup>-2</sup>, or those who were at risk  
66 of aspiration (non-fasted, gastroesophageal reflux disease) were excluded.

### 67 Study Procedures

68           Following premedication with intravenous midazolam (0.02-0.03 mg.kg<sup>-1</sup>), the  
69 patients were taken to the operating room and standard anaesthesia monitoring was applied.  
70 Anaesthesia was induced by fentanyl 2 µg.kg<sup>-1</sup> and propofol 2 mg.kg<sup>-1</sup>. Neuromuscular  
71 blockade was achieved with intravenous rocuronium 0.6 mg.kg<sup>-1</sup>. The lungs were ventilated  
72 via a face mask until complete neuromuscular blockade was achieved. An experienced LMA  
73 user (use of P-LMA>100 times) performed all insertions and an independent observer  
74 collected the intra-operative data. A blinded, trained observer collected the data post-  
75 operatively.

76           A size 3 P-LMA or S-LMA was used for adults weighing 30–50 kg, a size 4 P-LMA  
77 or S-LMA was used for adults weighing 50–70 kg and a size 5 P-LMA or S-LMA was used  
78 for adults weighing 70–100 kg. A lidocaine spray was used as a lubricant for airway devices  
79 and drainage tubes. P-LMA was inserted using the digital insertion technique in the sniffing  
80 position, while S-LMA was inserted using the single-handed rotational technique in the semi-  
81 sniffing position in accordance with the manufacturer's instructions. Following insertion, the  
82 patients' heads were stabilized in the neutral position, the cuff of the airway device was air-  
83 inflated to a pressure of 60 cmH<sub>2</sub>O and the cuff pressure was maintained at 60 cmH<sub>2</sub>O  
84 throughout the procedure using a cuff monitor (Endotest; Rüsch, Kernen, Germany). The  
85 LMA was connected to a circle breathing system. The number of insertion attempts required  
86 for both devices was recorded. The consideration of device use as a failure, required three  
87 attempts. In cases when it was not possible to achieve a satisfactory result with the  
88 randomised device, tracheal intubation was performed. OLP was identified by closing the  
89 expiration valve of the circle system at a constant gas flow of 3 L.min<sup>-1</sup> (peak airway pressure  
90 was allowed as a maximum of 40 cmH<sub>2</sub>O).The pressure at which an audible leak occurred  
91 through the mouth was recorded. Insertion time was defined as the time between picking up  
92 the P-LMA or S-LMA and obtaining an effective airway. Once an effective airway was  
93 obtained, a well-lubricated 16-French size drainage tube was passed into the stomach in each  
94 patient and connected to the passive drainage system. Appropriate tube placement was  
95 verified by auscultation over the stomach while 20 ml of air was injected into the tube. The  
96 time elapsed for the proper placement of the tube was recorded. Anaesthesia was maintained  
97 with 4 % - 6 % desflurane in 40 % oxygen and nitrous oxide. The lungs were ventilated using  
98 a volume-controlled ventilator (Primus, Dräger Medical AG & Co., Lübeck, Germany) with a  
99 FiO<sub>2</sub> of 0.40 and a tidal volume of 8 ml.kg<sup>-1</sup> at a respiratory rate (RR) of 12 breaths.min<sup>-1</sup>, and  
100 with an inspiration/expiration ratio of 1/2 and 3 L.min<sup>-1</sup> of a fresh gas flow. If the end-tidal  
101 carbon dioxide (ETCO<sub>2</sub>) increased above 40 mmHg, RR was first increased to 14 breaths.min<sup>-1</sup>

102 <sup>1</sup> then 16 breaths.min<sup>-1</sup>, and then tidal volume was increased to 12 ml.kg<sup>-1</sup>. Ventilation was  
103 considered suboptimal if ETCO<sub>2</sub> was > 45 mmHg or failed if ETCO<sub>2</sub> was >55 mmHg. If S<sub>p</sub>O<sub>2</sub>  
104 level fell below 95 %, FiO<sub>2</sub> was increased to 0.5, then 0.6. If S<sub>p</sub>O<sub>2</sub> was observed within the  
105 value of 94-90 % the oxygenation was considered suboptimal and if S<sub>p</sub>O<sub>2</sub> was < 90%  
106 oxygenation was considered as a failure.

107 Pneumoperitoneum was established by insufflations of carbon dioxide to a pressure of  
108 14 mmHg. OLP, S<sub>p</sub>O<sub>2</sub>, expired tidal volume, ETCO<sub>2</sub>, RR, mean arterial pressure (MAP) and  
109 heart rate (HR) were recorded at four different measurement times: T<sub>0</sub>, control value, in the  
110 supine position, immediately before the induction of pneumoperitoneum; T<sub>1</sub>, five minutes  
111 after the induction of pneumoperitoneum, by positioning the patients' heads with a head-up  
112 tilt of 30 degrees and with 15 degrees left lateral rotation; T<sub>2</sub>, five minutes before peritoneal  
113 deflation; and T<sub>3</sub>, after removal of the trocars and Veress cannulas in supine position. The  
114 surgeon, who was blinded to the airway device, scored the degree of gastric distension on an  
115 ordinal scale ranging from 0 (the best score) to 10 (worst score) at insertion of the laparoscope  
116 upon decompression of the pneumoperitoneum<sup>7</sup>.

117 We administered a crystalloid solution at a rate of 2 ml.kg<sup>-1</sup>.h<sup>-1</sup> during the surgery.  
118 Before completion of the surgery, the patients received intravenous ondansetron (4 mg) to  
119 avoid postoperative nausea, vomiting, and intravenous paracetamol (1000 mg) in order to  
120 provide postoperative analgesia. All patients received atropine and neostigmine to reverse the  
121 neuromuscular blockade. The drainage tube was removed before discontinuation of  
122 anaesthesia. The P-LMA or S-LMA was removed at the end of the surgery when the patient  
123 was able to open his/her mouth in response to a verbal command. Intraoperative  
124 complications including any circumstances such as aspiration, laryngospasm/bronchospasm,  
125 hypoxia (<92 %), cough, hiccup, requirement for another airway device placement, blood  
126 staining on the airway device, and minor tongue/lip/dental trauma were recorded. S<sub>p</sub>O<sub>2</sub>, MAP,  
127 HR and postoperative nausea and vomiting were documented in the post anaesthesia care unit  
128 (PACU). A blinded anaesthesiologist questioned the patients in terms of postoperative  
129 pharyngolaryngeal adverse events (sore throat, dysphonia and dysphagia) before leaving the  
130 PACU. The patients graded the symptoms as 0 (none), 1 (mild), 2 (moderate) or 3 (severe).

### 131 Statistical Analysis

132 Based on the results of a previous study, in which OLP for P-LMA was reported to be  
133 29 cmH<sub>2</sub>O with a standard deviation of 6 cmH<sub>2</sub>O, a sample size calculation was performed<sup>8</sup>.  
134 Sample size was based on an estimated difference of 5 cmH<sub>2</sub>O between the groups for OLP, a  
135 type 1 error of 0.05 and power of 90 %; power analysis indicated that 28 patients per group

136 would be required. In order to increase the study's power and to secure the 28 required  
137 patients in case of any dropouts, we included 30 patients in each group. The SPSS 13.0  
138 statistical software system (SPSS Inc, Chicago, IL, USA) was used for statistical analysis. The  
139 distribution of data was determined using the Kolmogorov–Smirnov analysis. Parametric data  
140 was analysed by paired t-tests in the groups and by an ANOVA test between the groups.  
141 Nonparametric data was analysed with the Mann–Whitney rank-sum test and the Chi-square  
142 test. A p value < 0.05 was considered statistically significant.

## 143 **Results**

144 In the present study, 60 patients were randomised into either the S-LMA group (n=30)  
145 or the P-LMA group (n=30); however, one patient in the P-LMA group was excluded from  
146 the study since the laparoscopic procedure was transformed into an open procedure.  
147 Therefore, 59 patients were analyzed in this study (Figure 1). There were no significant  
148 differences between the patients' status and preoperative airway characteristics of the groups  
149 (Table 1). The first insertion attempts were successful in 28 patients (93 %) of the S-LMA  
150 group and 27 patients (93 %) of the P-LMA group (p=0.68). The mean insertion time was  
151 significantly shorter in the S-LMA group than in the P-LMA group ( $12.5 \pm 4.1$  sec versus  
152  $15.6 \pm 6.0$  sec; **p=0.027**). Insertion success rates for the drainage tube were similar in both  
153 groups (S-LMA, 100 %; P-LMA, 93 %; p=0.23). Drainage tube was inserted more quickly in  
154 the S-LMA group than in the P-LMA group ( $9.0 \pm 3.2$  sec versus  $14.7 \pm 6.6$  sec; **p=0.001**).  
155 The degree of gastric distension of the groups defined by the surgeon was similar to each  
156 other (p=0.67) (Table 2). The data regarding OLP and respiratory changes during  
157 pneumoperitoneum are depicted in Table 3. No significant difference was found in terms of  
158 the mean values of OLP between the S-LMA group and P-LMA groups at T<sub>0</sub> ( $27.8 \pm 2.9$   
159  $\text{cmH}_2\text{O}$  versus  $27.0 \pm 4.7$   $\text{cmH}_2\text{O}$ ; p=0.42). OLP values did not change during the induction  
160 of and throughout pneumoperitoneum. ETCO<sub>2</sub> increased significantly during the  
161 pneumoperitoneum compared to control values with both S-LMA and P-LMA. The changes  
162 of ETCO<sub>2</sub> values were not different between the groups. The adjusted settings of RR and FiO<sub>2</sub>  
163 that were required for optimal ventilation and oxygenation were similar in the groups. S<sub>p</sub>O<sub>2</sub>  
164 changes were in normal ranges and did not fall below 92 % in any patient (Table 3).

165 In both groups, MAP decreased significantly during the induction of  
166 pneumoperitoneum compared with the control values; however, no significant change was  
167 observed in HR. There were not any significant differences between the groups concerning  
168 haemodynamic responses during the induction of pneumoperitoneum, either. Aspiration,

169 laryngospasm/bronchospasm, hypoxia and minor tongue/lip/dental trauma were not observed  
170 in any of the patients.

171 The rates of pharyngolaryngeal morbidity were also similar in the groups. Blood  
172 staining on the airway device was detected in one patient in the S-LMA group and in two  
173 patients in the P-LMA group. In the PACU, vomiting was observed in five patients (three  
174 females and two males) in the S-LMA group and in one female patient in the P-LMA group  
175 ( $p=0.10$ ). There were not any significant differences with respect to haemodynamic and  
176 respiratory responses between the groups in the PACU. The duration of the PACU stay was  
177 also not different between the groups ( $p=0.88$ ) (Table 4).

## 178 **Discussion**

179 In this study, we compared the safety and efficacy of the S-LMA and P-LMA in  
180 laparoscopic cholecystectomy procedures. The findings of our study showed that even though  
181 the mean OLP values and airway device insertion success rates of two airway devices were  
182 similar to each other, the S-LMA was more quickly inserted than P-LMA.

183 While Carbon dioxide pneumoperitoneum results in ventilatory and respiratory  
184 change, thoracopulmonary compliance decreases and pulmonary resistance increases.  
185 Therefore, leak pressures gain a further significance with regards to the continuation of  
186 ventilation in laparoscopic cholecystectomy. While there are comparative studies on the safe  
187 usability of S-LMA in gynaecological laparoscopy, studies on laparoscopic cholecystectomy  
188 have not been reported in the literature yet<sup>9</sup>. In our study, the mean OLP values with the S-  
189 LMA and P-LMA were found as 27 cmH<sub>2</sub>O before the pneumoperitoneum, OLP did not  
190 change with two airway devices throughout the pneumoperitoneum. The increase in ETCO<sub>2</sub>  
191 values was not considered clinically significant as it was within the physiological limits.  
192 Beleña et al.<sup>10</sup> found that the OLP was similar to our results (28 cmH<sub>2</sub>O) with S-LMA in their  
193 descriptive study and they suggested that S-LMA used as a suitable airway device in  
194 laparoscopic cholecystectomy.

195 In a previous study which compared the S-LMA and P-LMA in gynaecological  
196 laparoscopy, the OLP and the maximum achievable tidal volume were lower with the S-LMA  
197 than with the P-LMA<sup>9</sup>. On the contrary Abdi et al.<sup>11</sup> found that the OLP for the S-LMA was >  
198 30 cmH<sub>2</sub>O in 95 % of the patients and S-LMA and the tracheal tube were similarly effective  
199 airways. The technique of OLP measurement may influence the results. Abdi et al.<sup>11</sup>  
200 measured the OLP using the ventilator in a pressure-controlled manner and defined a sealing  
201 pressure. We measured OLP during manual ventilation and defined OLP as the pressure value  
202 at the moment when the audible sound of gas leakage from the mouth was heard. In our study,

203 we measured OLP in regular intervals from the start until the completion of the surgery and  
204 found it similar at all time points. In their study, Lee et al.<sup>9</sup> examined a female population and  
205 inserted size 4 S-LMA or P-LMA. Abdi et al.<sup>11</sup> determined the size of S-LMA based on the  
206 height of the patient. We determined the size of the airway devices based on body weight and  
207 we used 3.4.5 sizes.

208 Van Zundert et al.<sup>1</sup> report that the increased OLP values with S-LMA are associated  
209 with the increase of intracuff pressures. Yet another study asserts that with the S-LMA, higher  
210 leak pressures are obtained at high intracuff pressures<sup>12</sup>. On the contrary, despite the increased  
211 intracuff pressures during surgery, OLP did not increase in our previous study<sup>3</sup>. While the  
212 silicone cuff of the P-LMA is permeable and intracuff pressure can increase when nitrous  
213 oxide is used, the cuff of The S-LMA is made of polyvinyl chloride is less elastic and less  
214 permeable to nitrous oxide<sup>13</sup>. We maintained the cuff pressure at 60 cmH<sub>2</sub>O to eliminate the  
215 potential confounder effect of cuff pressure.

216 We found the first-attempt insertion success rate was 93 % for both S-LMA and P-  
217 LMA. In the literature, first attempt success rates were reported to range between 90-100 %  
218 for S-LMA and 76-100 % for P-LMA<sup>14,1,3,15</sup>.

219 In our previous study in which S-LMA and P-LMA were compared, we found that  
220 insertion times were similar with both airway devices<sup>3</sup>. However, in this current study, we  
221 found that insertion time was shorter with S-LMA than with P-LMA. This difference,  
222 although statistically significant, is unlikely to be clinically important. Compared with the P-  
223 LMA, the design of S-LMA has several refinements: the airway tube has an anatomical shape,  
224 and more rigid than the P-LMA airway tube. This configuration allows for easy and reliable  
225 insertion. These advantages and increased experiences with S-LMA may be responsible for  
226 the shortened insertion time observed in the present study.

227 The drainage tube of the S-LMA is directly posterior to the ventilatory side and runs  
228 through the midline of the airway tube. We believe that an improved drainage tube design  
229 may explain the shortened insertion times of drainage tube for the S-LMA. This easy gastric  
230 access may be an additional safety benefit with the use of the S-LMA for this type of surgery.

231 Gastric distension may occur when high airway pressure is employed to overcome a  
232 partially obstructed airway or it may occur from inadvertent esophageal intubation with LMA.  
233 Consequently, this gastric distension may be a cause of nausea and vomiting, and stomach  
234 perforation during laparoscopy<sup>16,17</sup>. In our study, the degree of gastric distension scores of the  
235 groups were similar to each other. In more than 90 % of cases, the surgeon estimated that  
236 scores were less than 2 with two airway devices.

237           When the patients had been evaluated before they were taken out the PACU, the  
238 postoperative adverse effects seemed to be similar. However, they were still under the  
239 influence of paracetamol at that time, the results could have been different if they had been  
240 evaluated at a later phase.

241           In the S-LMA group, the number of vomiting patients was higher than that in the P-  
242 LMA group. Although not statistically significant, this result may be clinically important  
243 Since we had not predicted this outcome, we did not investigate the causes of nausea and  
244 vomiting. Measurement of gastric fluid volume, for example, could be useful to this end. This  
245 is one of the limitations of our study.

246           In conclusion, this study demonstrated that both S-LMA and P-LMA group had  
247 similar oropharyngeal leak pressures. Optimal ventilation and oxygenation were obtained with  
248 two airway devices, hence S-LMA can be used in laparoscopic cholecystectomies with  
249 suitable patients and experienced users as an alternative to the P-LMA. However, further  
250 studies are required not only for comparing both airway devices in terms of postoperative  
251 nausea and vomiting but also for yielding definitive results. The outcomes of such studies  
252 may affect the use of these two airway devices, particularly in laparoscopic  
253 cholecystectomies, in which these adverse effects are commonly observed.

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305 **Table 1.** Patients' status and pre-operative airway characteristics. Values are presented as  
 306 mean  $\pm$  SD, or as numbers, or as numbers (%), as appropriate.

	<b>Proseal-LMA *</b> <b>(n=29)</b>	<b>Supreme-LMA *</b> <b>(n=30)</b>
Age, years	44 $\pm$ 14	50 $\pm$ 9
Height, cm	169 $\pm$ 8	169 $\pm$ 10
Weight, kg	69 $\pm$ 17	72 $\pm$ 14
Body mass index, kg.m <sup>-2</sup>	25 $\pm$ 7.6	26 $\pm$ 6.7
ASA grade I / II	14/15	14/16
Preoperative drug usage, Yes/No	14/15	14/16
Smoking, Yes/No	9/20	8/22
Gender, Male/Female	17/12	18/12
Mallampati score, 1/2/3	20/6/3	19/6/5
LMA size, 3/4/5*	1/8/20	2/10/18
Dentition, normal/lacking/edentulous	8/20/1	4/24/2

307 \*LMA: Laryngeal mask airway.

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319 **Table 2.** Assessment of airway device placement, surgical and anaesthetic characteristics.

320 Values are presented as mean  $\pm$  SD, or as numbers, or as numbers (%), as appropriate.

		<b>Proseal-LMA*</b>	<b>Supreme-LMA*</b>	P value
		<b>(n=29)</b>	<b>(n=30)</b>	
	1	27 (93 %)	28 (93 %)	
Number of insertion attempts	2	2	2	0.68
	3	0	0	
Airway device insertion time, sec		15.6 $\pm$ 6.0	12.5 $\pm$ 4.1	<b>0.027</b>
	1	27 (93 %)	30 (100 %)	
Drainage tube insertion attempts	2	2	0	0.23
	3	0	0	
Drainage tube insertion time, sec		14.7 $\pm$ 6.6	9.0 $\pm$ 3.2	<b>0.001</b>
Duration of pneumoperitoneum, min		62.7 $\pm$ 32.3	62.2 $\pm$ 31.0	0.94
Duration of anaesthesia, min		68.3 $\pm$ 9.4	69.2 $\pm$ 10.5	0.73
Degree of gastric distension; 0/1/2/3/4/5		24/3/1/0/1	24/3/2/1/0	0.67
Total fentanyl dosage, $\mu$ g		150.0 $\pm$ 26.8	140.3 $\pm$ 26.3	0.16

321 \*LMA: Laryngeal mask airway.

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337 **Table 3.** Respiratory, haemodynamic and oropharyngeal leak pressure changes during the  
 338 induction of pneumoperitoneum. Values are presented as mean  $\pm$  SD, or as numbers, as  
 339 appropriate.

	Time	Proseal-LMA* (n=29)	Supreme-LMA* (n=30)	p value
Oropharyngeal leak pressure, cm H <sub>2</sub> O	T <sub>0</sub>	27.0 $\pm$ 4.7	27.8 $\pm$ 2.9	0.42
	T <sub>1</sub>	26.3 $\pm$ 5.3	27.6 $\pm$ 4.9	0.30
	T <sub>2</sub>	26.7 $\pm$ 6.1	26.9 $\pm$ 4.9	0.84
	T <sub>3</sub>	26.1 $\pm$ 5.4	27.2 $\pm$ 5.1	0.40
End tidal CO <sub>2</sub> , mm Hg	T <sub>0</sub>	30.5 $\pm$ 3.0	29.5 $\pm$ 3.4	0.17
	T <sub>1</sub>	30.2 $\pm$ 6.1	29.6 $\pm$ 3.3	0.65
	T <sub>2</sub>	34.0 $\pm$ 3.7†	33.5 $\pm$ 2.9†	0.53
	T <sub>3</sub>	34.4 $\pm$ 3.3†	33.6 $\pm$ 3.8†	0.38
Expired tidal volume, ml	T <sub>0</sub>	616.3 $\pm$ 98.8	591.8 $\pm$ 110.0	0.37
	T <sub>1</sub>	620.3 $\pm$ 99.4	588.8 $\pm$ 110.9	0.25
	T <sub>2</sub>	617.8 $\pm$ 91.2	587.8 $\pm$ 115.3	0.27
	T <sub>3</sub>	613.0 $\pm$ 94.5	589.7 $\pm$ 114.4	0.39
Respiratory rate, breaths.min <sup>-1</sup> , 12/14/16	T <sub>0</sub>	29/0/0	30/0/0	0.89
	T <sub>1</sub>	29/0/0	30/0/0	0.89
	T <sub>2</sub>	25/4/0	25/3/2	0.34
	T <sub>3</sub>	25/4/0	25/3/2	0.34
S <sub>p</sub> O <sub>2</sub> , %	T <sub>0</sub>	99.5 $\pm$ 0.9	99.6 $\pm$ 0.6	0.40
	T <sub>1</sub>	99.3 $\pm$ 0.9	99.0 $\pm$ 1.3†	0.35
	T <sub>2</sub>	98.5 $\pm$ 1.4†	98.4 $\pm$ 1.1†	0.65
	T <sub>3</sub>	99.9 $\pm$ 1.2†	98.8 $\pm$ 1.2†	0.67

340 \*LMA: Laryngeal mask airway.

341 †p<0.05 compared with the control values within the group.

342 T<sub>0</sub>; control value, T<sub>1</sub>; five minutes after the induction of pneumoperitoneum, T<sub>2</sub>; five minutes  
 343 before peritoneal deflation; T<sub>3</sub>; after removal of the trocars and Veress cannulas.

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348 **Table 4.** Postoperative data in the post anaesthesia care unit. Values are presented as mean ±  
349 SD, or as numbers (%), as appropriate.

		<b>Proseal-LMA*</b> <b>(n=29)</b>	<b>Supreme-LMA*</b> <b>(n=30)</b>	<b>p value</b>
Sore throat, 0/1/2/3		25/4/0/0	28/2/0/0	0.31
Dysphonia, 0/1/2/3		29/0/0/0	30/0/0/0	0.89
Dysphagia, 0/1/2/3		28/1/0/0	27/2/1/0	0.51
Vomiting		1 (3.4 %)	5 (16.6 %)	0.10
Mean arterial pressure, mmHg	5 <sup>th</sup> min	110.8 ± 18.9	102.5 ± 17.8	0.08
	15 <sup>th</sup> min	101.6 ± 16.3‡	97.1 ± 16.5‡	0.29
Heart rate, beats.min <sup>-1</sup>	5 <sup>th</sup> min	80.9 ± 13.6	74.4 ± 12.7	0.06
	15 <sup>th</sup> min	74.6 ± 9.8‡	69.6 ± 12.4‡	0.09
SpO <sub>2</sub> , %	5 <sup>th</sup> min	99.0 ± 1.9	99.2 ± 1.1	0.56
	15 <sup>th</sup> min	99.6 ± 0.7	99.6 ± 0.9	0.92
Duration of staying in PACU; min†		15.2 ± 5.0	14.8 ± 3.6	0.88

350 \*LMA: Laryngeal mask airway; †PACU: Post anaesthesia care unit.

351 ‡P<0.05 between the 5<sup>th</sup> and 15<sup>th</sup> minute values within the group.

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365 **Figure Legends**

366 **Figure 1:** Patient's flow chart. S-LMA: Supreme Laryngeal mask airway; P-LMA: Proseal  
367 Laryngeal mask airway.

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