Triamcinolone Acetonide Paste Applied over the Laryngeal Mask Airway to Reduce the Severity of Postoperative Sore Throat

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Objective: Topical steroids are a good option for preventing postoperative sore throat (POST). This study examined whether triamcinolone paste applied as lubricant reduces the severity of POST following laryngeal mask airway (LMA) insertion.

Methods: This was a prospective, randomized, double-blind, placebo-controlled clinical trial. The study enrolled 50 American Society of Anesthesiologists (ASA) I-II patients who were between 20 and 70 years of age and scheduled for elective surgery under general anesthesia. The patients were divided randomly into two groups. Patients in the chlorhexidine group (the placebo group) were inserted with a LMA lubricated with chlorhexidine gluconate jelly, whereas patients in the triamcinolone group were inserted with a LMA lubricated with 0.1% triamcinolone acetonide paste. The patients were interviewed 1, 6, and 24 hours after the operation. The incidence and severity of POST and the incidence of cough and hoarseness were recorded.

Results: The difference of the POST incidence during the 24 hours after the operation was not significant (34.8% in triamcinolone group vs. 45.5% in chlorhexidine group, P= 0.381). The severity score in the triamcinolone group was significantly lower than the chlorhexidine group at 1 hour after the operation (P< 0.001). No significant differences were found in the incidence of cough, hoarseness, dysphagia, nausea, or dry throat between the two groups.

Conclusion: Triamcinolone paste applied as lubricant reduces the severity of POST following LMA insertion.

Keywords: Complications; Laryngeal masks; Analgesics; Triamcinolone acetonide
lopo method. Patients in the chlorhexidine group were inserted with a LMA lubricated with chlorhexidine gluconate jelly, and patients in the triamcinolone group were inserted with a LMA lubricated with 0.1% triamcinolone acetonide paste. All LMA were prepared by one investigator, just before insertion. All anesthetic procedures were performed by one experienced anesthesiologist who were blinded to the group allocation. The investigators who collected data and interviewed patients did not perform any of the procedures and were blinded to the group allocation. All patients were blinded to group allocation.

Patients were premedicated with intramuscular glycopyrrolate 0.2 mg. In the operating room, the monitoring consisted of three-lead electrocardiography, noninvasive arterial blood pressure, pulse oximetry, and end-tidal CO₂. Induction was accomplished with fentanyl 50 µg and propofol 2 mg/kg followed by rocuronium 0.6 mg/kg. Before insertion of a LMA, ventilation was controlled with 100% oxygen via a face mask. LMA insertions were performed 3 minutes after rocuronium injection. The LMA with a size of 3.0 or 4.0 were used for male or female patients, respectively. The LMA cuff was fully inflated during the preparation to ensure that the lubricants were applied uniformly. Immediately after insertion, the LMA was inflated in air until no air leakage could be heard at a peak airway pressure of 20 cmH₂O. Then, the cuff pressure was adjusted to between 10 and 20 cmH₂O using a hand held pressure gauge (Portex Cuff Inflator/Pressure Gauge, SIMS Portex, Hythe, Kent, UK). Anesthesia was maintained with 50% O₂ using a hand held pressure gauge (Portex Cuff Inflator/Pressure Gauge, SIMS Portex, Hythe, Kent, UK). Anesthesia was maintained with 50% O₂ in air, 7 to 8 vol% desflurane, and rocuronium. The end-tidal CO₂ was kept between 35 and 40 mmHg.

At the end of the surgery, the patients were given pyridostigmine 10 mg and glycopyrrolate 0.2 mg intravenously and the lungs were ventilated with 100% O₂ until the patient was fully awake and had recovered from muscle relaxation. The cuff was deflated fully, and the LMA removed. The patients were administered O₂ via a face mask, and transferred to the post-anesthesia care unit. All patients received fentanyl intravenously after the operation when they complained of operative wound pain. We did not restrict the use of fentanyl postoperatively, but no other analgesic was used.

The incidence and severity of POST was measured using direct questions [6] 1, 6, and 24 hours after the operation. The severity of POST was graded using a 4-point scale (0 to 3): 0, no sore throat; 1, mild sore throat; 2, moderate sore throat; and 3, severe sore throat. Visual analog scale (VAS) scores of wound pain were recorded at the same times. Complaints of cough, hoarseness, dysphagia, nausea, dry throat were recorded during the 24 hours after the operation. The total dose of fentanyl administered during induction and for 24 hours after the operation was also recorded.

For the statistical analysis, the t-test was used to compare between-group differences in age, weight, wound pain VAS score, and the total dose of fentanyl administered during induction and for 24 hours after the operation. The chi-square test was used to compare between-group differences in sex and ASA status. Between-group differences in the incidence of POST, cough, hoarseness, dysphagia, nausea, and dry throat for 24 hours after the operation were analyzed using chi-square test and Fisher's exact test as appropriate. The severity scores of POST were compared using the Mann-Whitney U-test. The results were expressed as the mean ± SD or absolute numbers or median and the range of 25 to 75th percentiles. SPSS ver. 14.0K (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. P < 0.05 was considered significant.

The primary outcome variable of this study was the incidence of POST during the 24 hours after the operation. Secondary outcome variables included the severity of POST, and the incidence of cough, hoarseness, dysphagia, nausea, and dry throat during the 24 hours after the operation.

**RESULTS**

Of the 50 patients enrolled, 5 were excluded from the analysis (3 in the chlorhexidine group and 2 in triamcinolone group); 2 patients required more than one insertion attempt, 3 patients vomited during the study period. The characteristics of the remaining 45 subjects are summarized in Table 1. No significant differences were observed between the two groups with respect to age, sex, weight, ASA status. The total doses of fentanyl administered during induction and for 24 hours after the operation and the wound pain VAS scores were comparable.

The difference of the POST incidence during the 24 hours after the operation was not significant (18.2% in chlorhexidine group vs. 13.0% in triamcinolone group, P = 0.381). The severity score in the triamcinolone group was significantly lower than the chlorhexidine group at 1h after the operation (P < 0.001). Two patients complained severe POST in chlorhexidine group vs. zero in triamcinolone group (Table 2). No significant differences were found in the incidence of cough, hoarseness, dysphagia, nausea, or dry throat between the two groups.
Table 1. Patient characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Chlorhexidine (n = 22)</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>43.5 (22-70)</td>
<td>0.093</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>7/15</td>
<td>0.408</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.5 ± 12.6</td>
<td>0.373</td>
</tr>
<tr>
<td>ASA (I/II)</td>
<td>14/8</td>
<td>0.068</td>
</tr>
<tr>
<td>Doses of fentanyl administered (µg)</td>
<td>59.2 ± 24.9</td>
<td>0.848</td>
</tr>
<tr>
<td>Wound pain VAS (0-10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 hr</td>
<td>5.3 (4.3-5.8)</td>
<td>0.841</td>
</tr>
<tr>
<td>6 hr</td>
<td>3.2 (3.2-4.4)</td>
<td>0.849</td>
</tr>
<tr>
<td>24 hr</td>
<td>1.9 (1.8-2.9)</td>
<td>0.744</td>
</tr>
</tbody>
</table>

Values are presented as mean (range), mean ± SD. No significant differences were found between the groups.

### DISCUSSION

In this study, we found that triamcinolone paste applied over the LMA decreases the severity of POST, compared with chlorhexidine jelly. Reduced inflammation and edema owing to the local steroid application may account for this finding.

Corticosteroids reduced the production of cytokines and other inflammatory mediators such as prostaglandins and leukotriens by inhibiting phospholipase A2 and cyclo-oxygenase 2 during inflammation. The anti-inflammatory action of topical corticosteroids allows them to inhibit inflammatory or ulcerative lesions in the mucosa effectively [7].

We adjusted for factors affecting POST, such as the anesthetic agent [8], use of a nasogastric tube, and vomiting, and the intracuff pressure [9] was limited. In addition, the same analgesics were used in both groups, and we confirmed that the severity of postoperative pain and the dose of analgesics used during the study period were not different between the groups. So, we could exclude a potential distractions effect. Therefore, the reduction in POST in our study as based only on the effect of lubricants.

Several studies using topical steroid lubricants to prevent POST have been reported. Ayoub et al. [3] reported that the application of betamethasone gel significantly reduced the incidence and severity of POST, cough, and hoarseness. Sumathi et al. [4] obtained similar results using betamethasone gel. In this study, we used triamcinolone acetonide rather than betamethasone. The acetonide component has been shown to dramatically enhance the penetration properties of triamcinolone, making it more active topically [10]. This property may have made triamcinolone acetonide more effective than betamethasone.

Although previous studies [3,4] have demonstrated the effect of topical steroid application via the tracheal tube, our study investigated the effect of triamcinolone acetonide rather than betamethasone, and evaluated the POST following the use of LMA. Triamcinolone has one-fifth the glucocorticoid activity of betamethasone, given the potential adverse effects associated with steroid use, including infections such as candidiasis, numbness, and dry mouth and throat. Moreover, triamcinolone acetonide contains two preservatives, methylparaben and propylparaben, that are effective antibacterial and antifungal agents commonly used as preservatives in foods, beverages, and pharmaceuticals [11]. And in this study, we used the LMA. Although the use of the LMA is considered to be associated with a lower incidence of postoperative sore throat [1], the severity of the individual complaints of minor laryngo-pharyngeal morbidity was comparable to the use of the endotracheal tube in the other study [12]. Therefore, we need efforts to reduce the complaints after using the LMA.

In this study, we could not find the effect of reducing the incidence of POST. This may be the result of the low incidence of POST following the use of LMA and the small number of sample size.

We used chlorhexidine gluconate jelly as a lubricant in the placebo group. Because chlorhexidine irritates the mucosa, it is possible that the differences seen are due to an increase the severity of POST in the chlorhexidine group, rather than a reduction in the triamcinolone group. However, no significant differences in POST were found between un lubricated and lubricated tubes in previous studies using chlorhexidine gluconate-containing jelly as a lubricant [13,14]. A potentiating effect of lubrication in reducing POST was also seen in one study [15].

Another limitation of this study was that all patients received dexamethasone 10 mg intravenously. Some studies have demonstrated that preoperative intravenous administration of dexamethasone significantly reduces the incidence of POST [16-18]. We used a similar dose of dexamethasone compared with these stud-
ies, which might conflict with the proposed effect of the lubricants. In our study, however, both groups received the same dose of dexamethasone following intubation. The difference in the incidence of POST between the two groups was considered to be based on the effect of lubricants.

In conclusion, our results indicate that a triamcinolone acetonide paste applied over the LMA can reduce the severity of POST compared with chlorhexidine gluconate jelly.

REFERENCES