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Laryngeal mask and laryngopharyngitis

Masanori Uchiyama, Akio Yoshino, Shigeo Kato, Yuichi Furukawa, Sachito Marumo, Junko Hirashima, Masahiro Okawa, Kazuhiko Tatsumi, Koichi Nishimura, Takeaki Hakoda, Shin Han, and Toru Yamamoto

Department of Anesthesiology, Nihon University School of Medicine, 30-1 Oyaguchi kami-machi, Itabashi-ku, Tokyo, 173 Japan

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Introduction

The laryngeal mask airway (LMA) was developed by Brain [1], and its use by anesthesiologists to maintain the airway during anesthesia is becoming popular. As its use becomes more frequent, more unusual complications due to its use are reported [2–6]. In one case, a patient recovering from anesthesia after the use of LMA sterilized by ethylene oxide gas (EOG) had various degrees of redness, edema, bulla, and pustule from the tongue, the posterior pharyngeal wall, and from around the larynx. The patient complained of dyspnea and showed mildly low oxyhemoglobin saturation.

Case report

A 49-kg, 156-cm, 22-year-old woman with no significant previous medical history was scheduled for the removal of a benign tumor in the bilateral thigh. She was premedicated with atropine 0.5 mg i.m. and hydroxidine 50 mg i.m. 1 h before operation. The epidural catheter was inserted at the L3–4 intervertebral space and 15 ml of 0.25% bupivacaine was given via the catheter before general anesthesia was induced. Anesthesia was then induced with midazolam 5 mg and 3% sevoflurane in nitrous oxide and oxygen (2:1) was given via face mask to achieve sufficient anesthesia to insert the No. 3 LMA (Intavent, Berkshire, England) sterilized with EOG 3 days before while the patient was allowed to breathe spontaneously. A laryngoscope was not used. The LMA lubricated by lidocaine jelly was easily inserted. Carbon dioxide in the end-tidal gases was measured to confirm that the LMA was in the correct position and that spontaneous ventilation was sufficient for getting a proper minute volume. Anesthesia was maintained with sevoflurane in nitrous oxide with oxygen plus lumbar epidural anesthesia. The end-tidal carbon dioxide concentration and oxyhemoglobin saturation remained stable throughout the procedure at 41–44 mmHg and 99%–100%, respectively. The operation was completed uneventfully and the patient awoke fully soon after the inhalation anesthetics were ceased. Although the patient returned to the ward without complaints, she began to complain of a mild sore throat 3 h after the operation. The sore throat worsened, and hoarseness and a feeling of moderate dyspnea appeared 9 h later. Then, bullae of various sizes were observed on the patient's tongue. The sore throat and dyspnea continued while 97%–98% of rather low oxyhemoglobin saturation was maintained with 30% oxygen via a face mask. Twenty-eight hours after the operation, the edema, bulla, and pustule originating in the dorsal region of the tongue and the posterior pharyngeal wall were also observed. This was thought to have been caused by the LMA in its usual location. As the cause of this change was likely due to allergic reaction to the drugs used or the material of the LMA, hydrocortisone was given intravenously concomitant with topical use of prednisolone ointment. All the symptoms disappeared gradually after the therapy, and the patient was discharged 7 days after operation. Patch tests for lidocaine were performed 1 month later, and the result was negative at 48 and 96 h after testing. A patch test for silicone was not performed because the patient refused.

Address correspondence to: A. Yoshino
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Discussion

In this case, dyspnea due to edema and bulla at the dorsal site of tongue, posterior pharyngeal wall, and around the larynx appeared after the use of LMA sterilized by EOG 3 days before application. We believed the changes were caused by LMA because of its usual location. An unskillful or repeated insertion of LMA may cause trauma to the uvula or pharynx [2], as well as bleeding postoperative sore throat, and edema of the pharyngeal wall [3]. Insertion of LMA, in this case, was smooth and it reached the hypopharynx very easily; furthermore, the main site of pathology was not traumatic but inflammatory, so that an allergic reaction to the drugs used or to the LMA material was suspected. LMA itself is made if silicone which is thought to be a weak irritant for tissue, and no allergic reaction to silicone has ever been reported.

The drug used is another possible factor. It is necessary to use lidocaine jelly for LMA insertion. Lidocaine is an amide-linked drug and the most commonly used local anesthetic agent today. An allergic reaction to amide-linked drugs is much more unusual than to ester-linked drugs, but there was a case reported of contact sensitivity to amide anesthetics [7]. In this case, patch tests for lidocaine were negative and no similar change was seen at the urethral orifice where lidocaine jelly was used as well. EOG residue in the LMA was thought to be the most likely cause. EOG is one of the most common sterilizing agents used mainly for disposable materials, and its sterilizing efficacy is very high. It is also been shown to have a rather high incidence of unexpected adverse effects, such as acute inflammation, because of EOG residue in rubber and hemolytic reaction due to EOG remaining in infusion lines made of PCV [8]. All the symptoms observed in this case are thought to be typical signs of inflammation caused by EOG. The LMA used was wrapped in a double-layered bag made for both autoclave and EOG sterilization (HOGY HM-1303, Tokyo, Japan) and simply left 3 days after being sterilized by EOG in the stock room, according to standard procedure. We believe it was enough time to get EOG off the LMA made of silicone because the amount of residual EOG in a given material is thought to depend upon how many days have passed after sterilization. For example, the residual EOG in PCV sterilized by recommended method is said to be 8000 ppm immediately after sterilization and it decreases to 40 ppm after 7 days. On the other hand, residual EOG in silicone is 700 ppm immediately after sterilization and decreases to 10 ppm after 2 days [8]. The FDA suggests that the maximum permissible EOG residue concentration in a device that contacts the skin and mucosa directly is less than 250 ppm [9] so that in this case 3 days should be acceptable. However, it has also been reported that the level of residual EOG in the material depends upon the thickness of the material [8]. Since silicone rubber used in LMA is rather thick, residual EOG in LMA in this case was thought to be much higher than we expected and was likely the cause of the problem. Laryngotracheitis due to EOG residues in the intratracheal tube caused serious and fatal conditions in one patient [10], so that the frequency with which EOG is used to sterilize the intratracheal tube actually has been reduced. It is known, that the methods of sterilization for LMA vary at each institution, while the LMA manual suggests it should be autoclaved. If the residual EOG in LMA has caused the inflammation of such a wide area in the oral cavity even though 3 days had passed after sterilization, the device should be left for at least 4 days or more in the stock room or should be left in an air chamber especially made for removing EOG [11]. We therefore believe that the use of the autoclave is essential.

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