The effect of glycopyrrolate premedication on postoperative sore throat

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Patients given general endotracheal anesthesia commonly experience postoperative sore throat and/or hoarseness. Our study examined whether the occurrence of postoperative sore throat was associated with the use of a glycopyrrolate premedication and found that it was.

We randomly assigned 120 patients undergoing general endotracheal anesthesia for routine surgery to receive a preoperative medication including or excluding glycopyrrolate. We controlled for factors known to increase the risk of a postoperative sore throat. After surgery, an interviewer, unaware of the subject's group assignment, questioned each subject about the presence of a sore throat and, if present, asked the patient to rate its severity. We found that patients who did not receive preoperative glycopyrrolate were significantly less likely to report having a sore throat or reported having a less severe sore throat than patients who did receive glycopyrrolate.

Key words: Glycopyrrolate, postoperative complications, sore throat.

Introduction
Patients given general anesthesia through an endotracheal tube frequently experience postoperative sore throat and/or hoarseness. While some consider this a minor anesthetic complication, it is one that causes patients discomfort and dissatisfaction. Factors which may contribute to the occurrence of a postoperative sore throat have been reported. Whether the use of a glycopyrrolate premedication contributes to postoperative throat pain has not been examined. We compared the incidence and severity of postoperative sore throats in surgical patients who received or did not receive glycopyrrolate as part of their preoperative medication.

Materials and methods
After obtaining institutional review board approval, we randomly assigned 198 consenting patients to receive a preoperative intramuscular injection consisting of either meperidine 50-75 mg, hydroxyzine 50 mg, and glycopyrrolate 0.2 mg, or similar doses of meperidine and hydroxyzine without glycopyrrolate. These medications were administered between 30 and 60 minutes prior to inducing anesthesia. Patients were randomly assigned to a study group based on the odd or even status of their medical record numbers.

Patients qualified for entry into the study if they were between the ages of 18 and 65, classified as ASA physical status I or II, were undergoing elective surgery lasting no longer than 120 minutes, and were not undergoing ear, nose, or throat surgery. Additionally, patients were not considered for the study if they had any of the conditions listed in Table I.
Table I
Exclusion criteria
Preexisting sore throat
History of gastric reflux
Nasogastric tube
Oral or nasal pharyngeal airway
Position other than supine or lithotomy
Coughing or bucking on intubation
Coughing or bucking prior to extubation
Difficult or traumatic intubation
Reintubation
Postoperative vomiting

Anesthesia was induced with sodium thiopental 3-5 mg/kg or propofol 1-2.5 mg/kg intravenously. After administering a defasciculant, succinylcholine 1-1.5 mg/kg was given to facilitate endotracheal intubation. Subjects were orally intubated with cuffed, high volume, low pressure endotracheal tubes (Argyle®). Size 7.0-mm internal diameter tubes were used for female subjects while 8.0-mm internal diameter tubes were used for male subjects.

All intubations were performed by skilled anesthesia providers. Lubricants, laryngotracheal anesthesia with 4% lidocaine spray, oral or nasal pharyngeal airways and airway humidifiers were not used. Padded tongue blades were used as bite blocks when needed. Endotracheal tube cuffs were inflated to the point that an audible air leak was lost. Esophageal stethoscopes were used in all subjects.

General anesthesia was maintained with either intravenous propofol or an inhalation agent and N₂O and O₂. Intraoperative nondepolarizing muscle relaxants and opioids were used as needed. Subjects were suctioned and extubated in the operating room after meeting routine criteria.

Twenty to 30 hours after surgery, each subject was interviewed by an anesthetist or ambulatory surgery nurse who was unaware of the subject's group assignment. First, the interviewer inquired about the patient's postoperative general welfare. Then the patient was directly questioned about the presence of a sore throat or hoarseness any time since surgery. Patients giving a positive response were then asked to rate the severity of the sore throat on a 1 to 3 scale as described by Loeser et al.:

1 = Minimal sore or scratchy throat, no hoarseness.
2 = Moderate sore throat and/or some hoarseness.
3 = Severe sore throat and/or obvious hoarseness.

The chi-square test was used to compare the incidence of postoperative sore throats, and the Mann-Whitney U test was used to statistically compare sore throat severity scores between the study groups.

Results
Data was analyzed from the remaining 120 subjects who met all entry requirements. Both groups were similar with respect to distribution of the following variables: age, sex, operative procedure, ASA physical status, smoking status, blade used for intubation, defasciculant, opioid, maintenance anesthetic, muscle relaxant, reversal agent, and anticholinergic received with the reversal agent.

The incidence of a postoperative sore throat was significantly higher (P < 0.05) in patients who received glycopyrrolate as part of their preoperative medication (Table II) when compared with those who did not. Of the patients who did complain of a postoperative sore throat, those who received glycopyrrolate before surgery had significantly greater throat pain (P < 0.05) than the patients who did not receive glycopyrrolate (Table III). It is noteworthy that none of the patients in the nonglycopyrrolate group complained of a severe sore throat, and only 3.6% (n = 2) even had a

Table II
Incidence of postoperative sore throats

<table>
<thead>
<tr>
<th>Sore throat</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycopyrrolate (n = 64)</td>
<td>56.3%</td>
<td>43.7%</td>
</tr>
<tr>
<td>No glycopyrrolate (n = 56)</td>
<td>26.8%</td>
<td>73.2%</td>
</tr>
</tbody>
</table>

(P = .0021 chi-square)

Table III
Severity of postoperative sore throats

<table>
<thead>
<tr>
<th>Sore throat severity score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycopyrrolate (n = 64)</td>
<td>43.7%</td>
<td>31.3%</td>
<td>15.6%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>
| No glycopyrrolate (n = 56) | 73.2% | 23.2% | 3.6% | 0%

0 = No sore or scratchy throat, no hoarseness
1 = Minimal sore or scratchy throat, no hoarseness
2 = Moderate sore throat and/or some hoarseness
3 = Severe sore throat and/or obvious hoarseness

(P = .0003 Mann-Whitney U test)
moderate sore throat. Of the glycopyrrolate recipients, 25% (n = 16) had a moderate or severe sore throat.

The data was also analyzed to determine if the maintenance anesthetic was associated with the occurrence of postoperative sore throats. We compared nitrous oxide (N₂O) and inhalation agents with N₂O and propofol and found no significant difference.

Discussion

Postoperative sore throat is a common complaint for patients who have had general anesthesia and an endotracheal intubation. The reported incidence varies with different studies, but a commonly cited incidence is around 40%. A higher incidence is found when patients are directly questioned about throat discomfort rather than indirectly questioned. In this study, we used direct questioning and found an overall incidence of postoperative sore throats of 43%.

Many studies have been done to identify factors that promote a postoperative sore throat. Some of these factors include endotracheal intubation, use of noncuffed endotracheal tubes or endotracheal tubes with large tracheal mucosa contact areas, insertion of pharyngeal packs or nasogastric tubes, and difficult or traumatic intubations. In one study, the use of intravenous lidocaine prior to induction was associated with a lower incidence of postoperative sore throats in subjects who received it compared to those who did not. Unfortunately, this last information did not become available to us until we already completed data collection, and therefore we did not control for lidocaine administration.

Factors that do not seem to have an impact on postoperative sore throats include the duration of intubation or surgical procedure, method of intubation (fiberoptic versus standard), use of local anesthesia spray prior to intubation, type of laryngoscope blade used for intubation, intra-cuff pressure or volume, age of patient, use of an oral pharyngeal airway, type of nondepolarizing muscle relaxant administered, and type of pharyngeal suction device used (Yankauer versus soft plastic catheter).

There are conflicting reports about some variables and their relationship to postoperative sore throats. The benefit of lubricating the endotracheal tube prior to insertion and best type of lubricant to use is unclear. Whether humidifying the inspired gases reduces throat pain or not is uncertain. It is also unclear if moving the patient's head or changing the patient's position during surgery contributes to postoperative throat pain. Studies evaluating the effect of patient gender on postoperative throat pain also have conflicting results. Some studies report a higher incidence of sore throats in female subjects, while other studies report no relationship between gender and postoperative sore throats. And finally, there are differing conclusions about the use of succinylcholine and its impact on postoperative throat pain.

While the topic of postoperative throat pain is well researched, there are limited data on the effect of preoperative medication. In fact, very few of the existing sore throat studies even addressed controlling for the administration of preoperative medication. In one study that did compare the effect of preoperative medication on postoperative throat pain, it was found that patients who received hypotensive prior to surgery had significantly more throat pain and dryness after surgery than subjects who did not receive this anticholinergic. The results of our study support the hypothesis that preoperative anticholinergic administration contributes to postoperative throat discomfort.

In a study comparing the anesthetic conditions in patients who received preoperative glycopyrrolate versus those who did not, no difference was found between the groups if the patients were intubated for surgery.

This study focused on the effect of glycopyrrolate administration on postoperative sore throats. A positive relationship between preoperative glycopyrrolate administration and postoperative throat pain in intubated patients was found. Finally, because anticholinergic administration seems to play a role in sore throat development, it is important that future studies related to postoperative sore throats control for this variable.

REFERENCES


AUTHORS
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ACKNOWLEDGMENTS
The authors would like to thank Scott Leupold, CRNA, MS, and the rest of the anesthesia providers and postanesthesia care nurses at Copley Memorial Hospital for their help with data collection. We would also like to thank Susan Shott, PhD, for her statistical guidance, and Margie Faut-Callahan, CRNA, DNSc, FAAN, for her overall support.
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Brief Summary of Prescribing Information

10% Xylocaine Oral Spray (lidocaine)
Flavored Topical Anesthetic Aerosol
For Use In The Oral Cavity

WARNING - CONTAINS UNDER PRESSURE

WARNING: Contains trichlorofluoromethane and dichlorodifluoromethane, substances which harm public health and environment by destroying ozone in the upper atmosphere.

CONTRAINDICATIONS: Xylocaine is contraindicated in patients with a known history of hypersensitivity to local anesthetics of the amide type or to other components of Xylocaine 10% Oral Spray.

WASHING: In ORDER TO MANAGE POSSIBLE ADVERSE REACTIONS, RESUSCITATIVE EQUIPMENT, OXYGEN AND OTHER RESUSCITATIVE DRUGS MUST BE IMMEDIATELY AVAILABLE WHEN LOCAL ANESTHETIC AGENTS, SUCH AS LIDOCAINE, ARE ADMINISTERED TO MUCOUS MEMBRANES.

Xylocaine 10% Oral Spray should be used with extreme caution if there is a sepsis or extremely traumatized mucosa in the area of application, since under such conditions there is the potential for rapid systemic absorption.

PRECAUTIONS:

General: The safety and effectiveness of lidocaine depend on proper dosage, correct technique, adequate precautions, and readiness for emergencies. Resuscitative equipment, oxygen, and other resuscitative drugs should be available for immediate use. (See WARNINGS AND ADVERSE REACTIONS.) The lowest dosage that results in effective anesthesia should be used to avoid high plasma levels and serious adverse effects. Repeated doses of lidocaine may cause significant increases in blood levels with each repeated dose because of slow accumulation of the drug or its metabolites. Tolerance varies with the status of the patient. Delirium, tremor,仆ilish, nausea, vomiting, confusion, dizziness, drowsiness, blurred or double vision, ventricular, sensations of heat, cold or numbness, twitching, tremors, convulsions, unconsciousness, respiratory depression and arrest. The excitatory manifestations may be very brief or may not occur at all, in which case the first manifestation of toxicity may be drowsiness merging into unconsciousness and respiratory arrest. Drowsiness following the administration of lidocaine is usually an early sign of a high blood level of the drug and may occur as a consequence of rapid absorption.

Central Nervous System: CNS manifestations are excitatory and/or depressive and may be characterized by light-headedness, nervousness, apprehension, euphoria, confusion, dizziness, drowsiness, somnolence, blurred or double vision, vomiting, sensations of heat, cold or numbness, twitching, tremors, convulsions, unconsciousness, respiratory depression and arrest. The excitatory manifestations may be very brief or may not occur at all, in which case the first manifestation of toxicity may be drowsiness merging into unconsciousness and respiratory arrest. Drowsiness following the administration of lidocaine is usually an early sign of a high blood level of the drug and may occur as a consequence of rapid absorption.

Cardiovascular System: Cardiovascular manifestations are usually depressant and are characterized by bradycardia, hypotension, and cardiovascular collapse, which may lead to cardiac arrest.

Allergic: Allergic reactions are characterized by cutaneous lesions, urticaria, edema or anaphylactoid reactions. Lidocaine reactions may occur as a result of sensitivity either to the local anesthetic agent or to other ingredients in the formulation. Allergic reactions as a result of sensitivity to lidocaine are extremely rare and, if they occur, should be managed by conventional means. The detection of sensitivity by skin testing is of doubtful value.

OVERDOSE: Acute emergencies from local anesthetics are generally related to high plasma levels encountered during therapeutic use of local anesthetics. (See ADVERSE REACTIONS, WARNINGS, and PRECAUTIONS.)

Management of Local Anesthetic Overdose: The first consideration is prevention, best accomplished by careful and consistent monitoring of cardiovascular and respiratory vital signs and the patient's state of consciousness after each local anesthetic administration. At the first sign of change, oxygen should be administered.

The first step in the management of convulsions consists of immediate attention to the maintenance of a patent airway and assisted or controlled ventilation with oxygen and a delivery system capable of permitting immediate positive airway pressure by mask. Immediately after the institution of these ventilatory measures, the adequacy of the circulation should be evaluated, keeping in mind that drugs used to treat convulsions sometimes depress the circulation when administered intravenously. Should convulsions persist despite adequate respiratory support, and if the status of the circulation permits, small increments of an ultra-short acting barbiturate (such as thiopental or thiamyl) or a benzodiazepine (such as diazepam) may be administered intravenously. The clinician should be familiar, prior to use of local anesthetics, with these anticonvulsant drugs. Supportive treatment of cardiovascular depression may require administration of intravenous fluids and, when appropriate, a vasopressor as directed by the clinical situation (e.g. dopamine).

Dialysis is of negligible value in the treatment of acute overdosage with lidocaine. The intravenous LD50 of lidocaine HCL in female mice is 26 (21-31) mg/kg and the subcutaneous LD50 is 264 (203-294) mg/kg.

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