TOPICAL ANAESTHESIA OF THE NASAL MUCOSA FOR FIBROOPTIC AIRWAY ENDOSCOPY

T. RANDELL, A. YLI-HANKALA, H. VALLI AND L. LINDGREN

SUMMARY

We have compared four methods of topical anaesthesia of the nostril for fibreoptic airway endoscopy in a randomized study with 31 unpremedicated volunteers, each serving as his or her own control. Lignocaine spray, EMLA cream, three cotton swabs soaked in 4% lignocaine solution, or 2% lignocaine gel was applied in a nostril for 3 min. Application of lignocaine spray was rated as the most unpleasant and EMLA cream the least unpleasant. Spray and gel caused an increase in arterial pressure. Anaesthesia of the mucosa, tested by passing a bronchoscope through the nose to the oropharynx was best with lignocaine spray or gel. Gel or EMLA, but not the local anaesthetic applied with swabs, obscured vision. When slight obscurity of vision is not a problem, local anaesthetic gel is recommended for anaesthesia of the nasal mucosa. Premedication or sedation is recommended for all the methods described here.

KEY WORDS


Fibreoptic bronchoscopy is commonly performed transnasally under topical anaesthesia of the airway [1–3] often supplemented with light sedation [1, 3, 4]. The application of topical anaesthetic to the nasal mucosa has been considered to be the most unpleasant part of fibreoptic bronchoscopy [1].

Lignocaine gel and lignocaine spray are generally used for topical anaesthesia of the nostril for fibreoptic bronchoscopy [5, 6]. Before fibreoptic bronchoscopy or intubation, we have applied topical anaesthesia to the nostril with two cotton swabs soaked in 4% lignocaine [4, 7]. With this method, patency of the selected nostril is verified and at the same time secretions may be removed [7, 8]. EMLA is a eutectic mixture of lignocaine and prilocaine originally synthesized for surface anaesthesia of the skin [9]. Recently, it has been successfully used also for anaesthetizing gingival mucosa [10].

This randomized study was designed to evaluate four different methods of topical anaesthesia of the nostril in 31 healthy unpremedicated volunteers each serving as his or her own control.

SUBJECTS AND METHODS

The study was approved by the local Ethics Committee. Thirty-one healthy unpremedicated volunteers were studied and each served as his or her own control. Four different methods of application of topical anaesthesia in the nostril were evaluated in a random order. In each individual, only one method was tested in a day. During the study, the subjects were in a supine position, without a pillow.

1. In the spray group, five doses of lignocaine 10 mg each (Xylocain, Astra, Södertälje, Sweden) were sprayed into the nostril.

2. In the EMLA group, 1 ml of EMLA cream (Astra, Sweden), containing prilocaine 25 mg and lignocaine 25 mg, was applied into the nostril to the depth of 1.5 cm. The subject was then asked to inhale deeply through the nostril. After 3 min the volunteer was asked to blow his or her nose.

3. In the swab group, three cotton swabs were soaked in 4% lignocaine solution (Lidocain, Orion, Finland). The cotton swabs were introduced into the nostril, one to the depth of 1.5 cm, and two to the depth of 2–2.5 cm. The swabs were kept in place for 3 min. The three cotton swabs absorbed on average 47 (SD 12) mg of 4% lignocaine.

4. In the gel group, 2% lignocaine gel 2.5 ml (Lidocain, Orion, Finland) was applied in the nostril to the depth of 1 cm.

For application of gel and EMLA, the anaesthetic was drawn into a 5-ml syringe, connected to a 3-cm length of suction catheter.

After 3 min, a flexible fibreoptic bronchoscope (Pentax FB-15H), lubricated with MCT oil, was passed through the nostril. The instrument was withdrawn after glottis and supraglottic structures had been visualized.

The subjects were asked to assess the application of the anaesthetic on a visual analogue scale (VAS) from 0 to 10: 0 = intolerable, 10 = not at all unpleasant. They were asked to describe the sensation immediately after topical anaesthesia of the nostril. After the fibrescope was withdrawn from the

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nostril, the subjects were asked to assess the effect of topical anaesthetic on a visual analogue scale from 0 to 10: 0 = intolerable, 10 = good anaesthesia of the nasal mucosa. The acceptance of the procedure by the subjects was evaluated by one of the authors on a scale from 0 to 10: 0 = protective movements in the head and arms; 10 = calm. Protective movements in the head only and apprehension (for example closing the eyes) were noted. The author performing the bronchoscopy evaluated the suitability of the topical anaesthesia for procedures from 0 to 10: 0 = view obscure, instrument difficult to advance through the nostril; 10 = clear view, no difficulties in advancing the instrument.

Heart rate and arterial pressure were recorded before and immediately after application of topical anaesthesia and before and after bronchoscopy. All the bronchoscopies were performed by the same author (T.R.).

Statistical methods

The results are presented as mean and SD. The results were compared using the General Linear Models procedure of the SAS Programme [11]. P < 0.05 was considered statistically significant.

RESULTS

We studied 15 females and 16 males (mean age 35 yr (range 24–59 yr)).

Application of topical anaesthesia was the least unpleasant with EMLA and the most unpleasant when the spray was used (P < 0.001) (fig. 1). Spray produced the best anaesthesia of the nasal mucosa, while with the swab technique anaesthesia was least effective (P < 0.001). Anaesthesia was significantly better also with lignocaine gel than with the swab technique (P < 0.001) (fig. 2). Fibrescopy was accepted well by the subjects when spray, EMLA or gel had been used (fig. 3).

Anaesthesia for bronchoscopy was best with the swab technique. VAS after lignocaine spray was 8.7, after EMLA 6.0 and after lignocaine gel 8.1 (significant difference between the EMLA and swab technique (P < 0.001) and between the gel and the swab techniques (P < 0.001)) (fig. 4). The view was clear in 30 of 31 occasions when the anaesthetic was applied with the swabs. With EMLA and gel the view was obscured in 23 of 31 and 18 of 29 occasions, respectively (table I).

Spraying anaesthetic on the nasal mucosa caused a significant increase in arterial pressure, and an increase in diastolic arterial pressure occurred also after application of 2% lignocaine gel. Passing the bronchoscope through the nostril did not increase arterial pressure in any of the study groups (fig. 5). There were no significant changes in heart rate with any of the techniques during the study.

The results were not related to age or sex of the subjects, or to the order of application of different local anaesthetics:

Twenty-one of 31 individuals complained of rhinorrhoea and sneezing lasting for several hours after treatment with EMLA. In one subject, application of EMLA was followed by lachrymation,
Table I. Clarity of view (number of subjects). †Assessment was not performed in two subjects

<table>
<thead>
<tr>
<th>Technique</th>
<th>Clear view</th>
<th>Slightly obscure</th>
<th>Obscure</th>
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<tbody>
<tr>
<td>Spray</td>
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<tr>
<td>EMLA</td>
<td>8</td>
<td>14</td>
<td>9</td>
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<tr>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Gel†</td>
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<td>15</td>
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**DISCUSSION**

The nasal cavity is innervated by the septal branch of the anterior ethmoidal nerve and the long and short sphenopalatine nerves. To achieve analgesia of the nasal mucosa, each of these should be anaesthetized. The conventional method of cotton-tipped applicators placed adjacent to the nerves in the sphenopalatine recess is time-consuming [12]. Various other methods of anaesthetizing the nasal mucosa for fibreoptic procedures have been suggested [4-8, 13], lignocaine spray and gel being those used most commonly [5, 6].

Spraying of lignocaine on the nasal mucosa was found to be the most unpleasant technique for anaesthetizing the nasal mucosa. This is in agreement with a previous study, in which spray was compared with lignocaine gel in patients undergoing fibreoptic bronchoscopy [5]. In the present study, spraying lignocaine on the nasal mucosa caused a marked pressor response. Application of gel caused an increase in diastolic arterial pressure. Therefore, neither lignocaine spray nor gel is recommended in patients with hypertension or ischaemic heart disease unless sufficient premedication or sedation (including an opioid) is given. EMLA and lignocaine gel were the least unpleasant methods; however, with EMLA untoward side effects such as sneezing and rhinorrhea, lasting for several hours after application, reduce its suitability in outpatients. Irritation of the nasal mucosa may be a result of the thick consistency of the cream, whilst the burning sensation produced by lignocaine spray may be caused by the ethanol solvent. Haasio and others [10] did not observe any damage to the gingival mucosa after application of either lignocaine spray or EMLA cream.

Lignocaine spray and gel have been shown to produce good anaesthesia of the nostril [5]. Our results are comparable with those of other investigators, but the effect was achieved with 50% of the dose used by Webb and others [5]. They did not report the time interval between application of local anaesthetic and the start of fibreoptic bronchoscopy. In our study, with these two methods, satisfactory anaesthesia of the nasal passages developed in 3 min, which was chosen as the time for testing because, in clinical practice, rapidity is often appreciated. With EMLA, anaesthesia was surprisingly poor, considering the fact that it is capable of producing anaesthesia of the skin [9]. Better results may have been obtained if the interval between application of local anaesthetic and testing had been longer. In an earlier report, however, analgesia of the oral mucosa was noted by 2 min after application of EMLA [14] but maximal analgesia was achieved in a mean time of 13 min [10]. With the swab technique, the dose of local anaesthetic varied, because of the amount of solution absorbed in the cotton swabs, but it was comparable to that of the other techniques used. The same technique was used successfully in our earlier studies in premedicated and in sedated patients [4, 7].

Posterior spread of local anaesthetic was different with the four methods. With the subjects in the supine position, some of the local anaesthetic flows down to the oropharynx shortly after application. After application of EMLA, the subjects were asked to inhale deeply to facilitate the spread of the anaesthetic to the posterior structures of the nasal passages also.

Webb and others did not report obscurity of vision with either lignocaine gel or spray [5]. In the present study, a clear view was noted in all but one occasion after application of local anaesthetic with the swabs. When the local anaesthetic is applied with swabs, the patency of the nostril may be verified simultaneously; furthermore, secretions may be removed from the nasal cavity, as suggested by Ovassapian.
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EMLA and gel were found to obscure the view in more than 50% of the subjects. For fibroptic tracheal intubation or tracheobronchial suction, this is not likely to cause problems. For diagnostic fibroptic bronchoscopy, however, maintaining a clear vision is important.

In conclusion, none of the present methods was superior to the others in every respect. Lignocaine gel was accepted well by the volunteers and is therefore recommended when slight obscurity of vision is not an insuperable problem. Because of its untoward side effects, EMLA is not suitable for topical anaesthetic techniques used, sedation is recommended for patients undergoing fibroptic bronchoscopy.

REFERENCES