Dynamics of Lidocaine in Topical Anesthesia for Office-based Laryngeal Procedures: A Pilot Study
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ABSTRACT
Objectives:
To study 4% lidocaine as a topical anesthetic for office-based laryngeal procedures by recording onset, duration, and subjective experience of topical laryngeal anesthesia.

Study Design:
Nine healthy volunteers were anesthetized with 4% lidocaine endoscopically. Laryngeal sensitivity prior to and during anesthesia was recorded until normal sensation returned measured by air-puff sensory testing. Subjective experience of the process was recorded.

Methods:
Questionnaires regarding subjective experience were completed prior to, during, and after anesthesia. Laryngeal sensitivity via air-pulse trigger of the laryngeal adductor reflex (LAR) prior to and after 3 mL of 4% lidocaine via laryngeal shower was recorded at 30 second intervals until the larynx was insensate with no LAR triggered at 10mmHg. Time to anesthesia was recorded and post-endoscopy questionnaire was given. Upon subjective change in sensation, sensitivity via air-pulse trigger of the LAR was recorded until baseline sensation returned. A post-anesthesia questionnaire recorded the subjective experience.

Results:
Average time to full anesthesia was 110 seconds (+/-31.2). Subjective return of sensation was noted at 10 minutes (+/-2.5), however time to return to normal LAR was 22 minutes (+/-5.8). Based on three standard deviations, 99.7% of the population will be anesthetized at 3.4 minutes, report subjective change at 18.2 minutes and regain full sensation at 40 minutes.

Conclusions:
Office-based laryngeal procedures should be performed at least two minutes following topical 4% lidocaine with a window for manipulation of at least 16 minutes. Oral intake should be delayed for over 45 minutes to ensure complete return of sensation. The laryngeal shower of lidocaine is subjectively well tolerated.

INTRODUCTION
Topical anesthetics have been used successfully for outpatient laryngeal procedures.
• Quicker, cheaper, and generally preferred by patients and physicians compared to general anesthesia.1
• Protocols based on expert opinion differ between institutions
  • +/- SLP nerve blocks, nebulized lidocaine, oral/nasal/cricothyroid approach

Multiple Institution Review (Rosen et al, 2009)
• Topical nasal anesthesia for 5-10min
• Trans-nasal endoscopy
• 3-5 cc of 4% lidocaine directly on VF’s

To our knowledge, there have been no objective studies analyzing the dynamic time course of anesthesia during endoscopy.

METHODS AND MATERIALS
Nine IRB consented healthy normal subjects anesthetized topically with 4% lidocaine
• 6 male, 3 female
• Mean age=25 (range 24-28)
• Non-smokers, endoscopy naive, no prior history of ENT pathology

Anesthesia onset and cessation monitored with the sensory component of FEESST (Flexible Endoscopic Evaluation of Swallowing with Sensory Testing)
• Trigger Laryngeal Adductor Reflex (LAR)
• 4 mm Hg (normal), 7 mm Hg, 10 mm Hg (max setting defining insensate)
• Previous studies have demonstrated no changes to FEESST results with nasal anesthesia (Postma, 2003).

Tolerance Questionnaires
• Discomfort scale (1-10), nausea, nasal discomfort, odynophagia, otalgia, anxiety
• Three time points
  • Baseline, insensate, and post procedure

RESULTS

Table 1. FEESST Results.
<table>
<thead>
<tr>
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<th>Mean +/- SD</th>
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<tbody>
<tr>
<td>Time to Anesthesia Onset</td>
<td>110 +/- 33  (sec)</td>
</tr>
<tr>
<td>Time to Anesthesia Cessation</td>
<td>22 +/- 5.8  (min)</td>
</tr>
<tr>
<td>Subjective Δ in Sensation</td>
<td>10 +/- 2.5  (min)</td>
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</tbody>
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Table 2.

<table>
<thead>
<tr>
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<th>Mean + 3SD</th>
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<tbody>
<tr>
<td>Time to Anesthesia Onset</td>
<td>3.4 (min)</td>
</tr>
<tr>
<td>Time to Anesthesia Cessation</td>
<td>40 (min)</td>
</tr>
<tr>
<td>Subjective Δ in Sensation</td>
<td>18.2 (min)</td>
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DISCUSSION

• When appropriate, Office-based laryngeal procedures are less time consuming, better tolerated, and preferred by both patients and physicians when compared to procedures requiring general anesthesia.

• Despite their popularity, topical anesthesia for these procedures has been solely based on expert opinion and has never been objectively studied.

• Multiple Institution Review Recommendations (Rosen et al, 2009)
  • Typical anesthesia within 90 seconds.
  • Theoretical duration of 45-60 minutes.
  • Functional surgical time is 20 minutes.

We offer preliminary data for topical anesthesia that confirms previous recommendations.

• Topical anesthesia is well tolerated with most common side effect being globus sensation.

• Complete anesthesia usually is achieved by ~2 minutes with a predicted upper limit of ~3 minutes.

• Subjects return to baseline laryngeal sensitivity ~20 minutes with a predicted upper limit of 40 minutes.

• Traditional clinical advice of PO avoidance for 45 minutes following anesthesia may be justifiable.

• Subjective change in sensation occurred at 10 +/- 2.5 minutes, prior to objective return of LAR. Patients should wait 45 minutes regardless of subjective assessment.

CONCLUSIONS

• Topical anesthesia for office-based laryngeal surgery is safe and subjectively well tolerated with the most common side effect being globus sensation.

• Full anesthesia is achieved on average under 2 minutes.

• Functional surgical time is on average 22 minutes.

• Recommendation to avoid PO intake at least 45 minutes after anesthesia.

REFERENCES