

Bench Model assessment of deposition of atomized solution via a prototype LMA MADgic laryngo-tracheal mucosal atomization catheter through a fiberoptic bronchoscope.

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Introduction

Topical anesthetic preparation of the upper airway prior to fiberoptic intubation is often imperfect. Supplemental anesthetic can be injected via the native bronchoscope lumen which generally does not give good drug distribution leading to a sub-optimal topical anesthetic and patient discomfort. A prototype LMA MADgic laryngo-tracheal mucosal atomization catheter threaded through a fiberscope was evaluated to determine if it increases the surface area of drug deposition.

Methods

A bench model of a typical human hypopharynx and larynx was constructed out of PVC pipe (38.1 cm long, 2.54 internal diameter) [1]. The topical anesthetic was

simulated with a solution of 10 drops of green dye per 100 ml H₂O. Dispersion was measured by pixel analysis (Adobe Photoshop, CA) of green pixels on a white wetted sheet of paper placed against the inside of the PVC pipe (threshold for considering a pixel green standardized by setting color range and fuzziness at 40%, black matte). Standardized injections of 1.0 ml of simulated anesthetic were delivered via a 4.5 mm adult bronchoscope channel (Karl Storz, Germany) and also via the prototype atomization catheter centered at distances from the model's laryngeal inlet (proximal end of PVC pipe) of 1, 5, and 10 mm. Each test was repeated 10 times. Results were compared using paired t-test.

Results

Only the prototype mucosal atomization catheter deposited simulated anesthetic in the supraglottic region of the model at 5 and 10 mm, Fig 2. At 10 mm the prototype atomizer covered 21% more total area ($p < 0.05$) when including the vocal fold and hypopharyngeal area, Fig 1.

Conclusion

Using dispersal area of green color as an indicator of medication deposition on the tracheal, hypopharyngeal and vocal fold representations in a bench model, our data suggest that the prototype atomization catheter can provide a greater area of drug dispersion in the supraglottic and subglottic regions at a clinically relevant distance of 10mm from the vocal folds than direct injection via an adult bronchoscope injection port.

References

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Figure 1

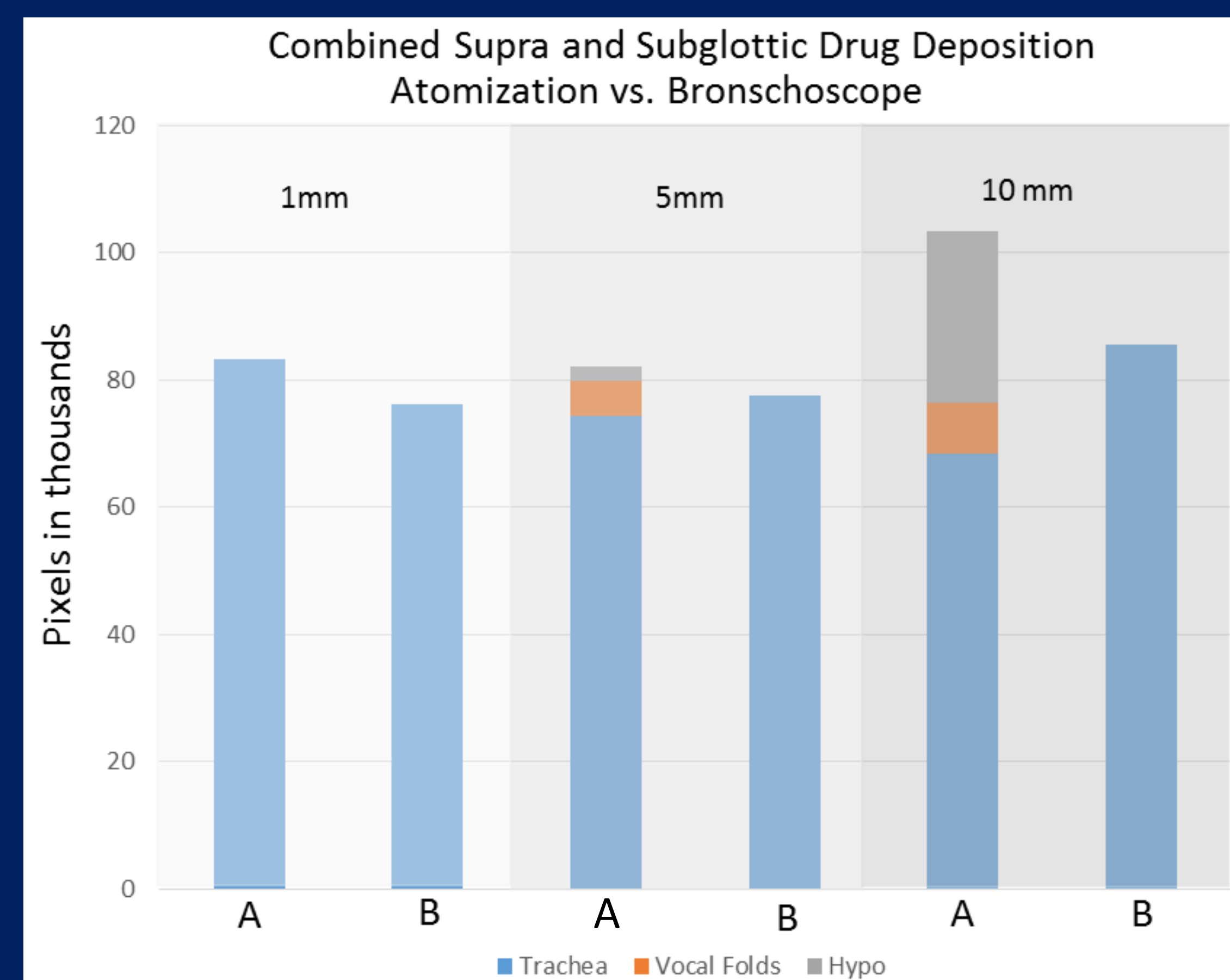


Figure 2

