Title: VASOCONSTRICTION OF NASAL MUCOSA BY 5% COCAINE COMPARED TO 4% LIDOCAINE/0.5% PHENYLEPHRINE

Authors: J. C. Vitaliti, M. D.*, C. N. Sessler, M. D.†, K. R. Cooper, M. D.†, J. R. Jones, M. D.*, K. Powell, Pharm.D.#, L. Pesko, M. S.#

Affiliation: Departments of Anesthesiology*, Medicine†, and Pharmacy#, Medical College of Virginia, Virginia Commonwealth University, Richmond, Virginia 23298

Introduction. Intranasal cocaine is used prior to nasotracheal intubation to provide local anesthesia as well as vasoconstriction of the nasal mucosa. Since cocaine is a controlled substance with a high abuse potential, an alternative solution would be useful. The combination of lidocaine and phenylephrine has been advocated as an alternative for short procedures. In a double blind crossover fashion the vasoconstrictive effects of 5% cocaine (control) were compared to 4% lidocaine/0.5% phenylephrine (test or L/P) by measuring nasal airway resistance and peak expiratory flow rate (PEFR).

Methods. Protocol approval was obtained from our institutional committee on the conduct of human research and consent was obtained from 12 adult volunteers. In a randomized blinded fashion each subject received control or test solution on the first study day and received the alternate solution on the second study day which was 48 hours after the first study day. Testing was performed prior to and following drug application. Blood pressure and pulse were recorded prior to and at 5,10, and 15 minutes following drug application. Drugs were applied by an atomizer delivering 6 sprays into each nostril for a total dose of 0.6 ml. Transnasal PEFR was performed using a Collins Eagle One Spirometer with the subject expiring into a modified nasal mask pressed tightly against the face with the lips sealed. Binasal resistance was performed with a tightly fitting Vital Signs face mask without air leaks. Airflow was measured through a pneumotach (Hewlett Packard 21071B) connected to the face mask. Transnasal pressure was measured using a Valdyne (MP45-5) strain gauge. The positive input of the strain gauge was attached to a small tube connected to the face mask. The negative input was attached to a similar tube inserted through a mouthpiece. With correct tongue placement, an open airway was provided from the mouth to the posterior pharynx, allowing transnasal pressure to be measured. Uninasal airway resistance was measured by occluding one nostril at a time with a cork and testing the patent nasal chamber. Nasal resistance was calculated by dividing transnasal pressure by airflow. Data were compared by Student's t-test unless otherwise noted.

Results. PEFR significantly increased after applying either test or control solution. Total, inspiratory, and expiratory binasal resistances dropped significantly after either 4% lidocaine/0.5% phenylephrine or 5% cocaine. Based on pre-drug resistances, uninasal airway resistance was grouped into lower uninasal airway resistance (open nasal chamber) and higher uninasal airway resistance (closed nasal chamber) rather than grouped anatomically into right and left nostril groups. This physiologic grouping was chosen since the human nasal cycle (1) could account for variations in uninasal airway resistance between the first and second study days. Since the data on closed nasal chamber resistance were not normally distributed, the Wilcoxon's rank-sum test was performed on that data. Both control and test solutions led to a significant reduction in closed nasal chamber airway resistance. Resistance did not change after drug application in the open nasal chamber group. Comparison of the percent change after cocaine versus the lidocaine/phenylephrine mixture revealed no significant difference in all categories tested. Blood pressure and pulse did not change significantly when evaluated by analysis of variance.

Discussion. The results support the equal efficacy of 5% cocaine and 4% lidocaine/0.5% phenylephrine as vasoconstrictors. Only the uninasal open chamber group failed to demonstrate a significant reduction in resistance post drug application, probably indicating that near maximal vasoconstriction had occurred as a result of the human nasal cycle. In patients receiving cocaine topically compared to a lidocaine/phenylephrine mixture, Hartigan (2) reported no difference in blood pressure and pulse post nasotracheal intubation after thiopental and succinylcholine induced general anesthesia. The combination of 4% lidocaine/0.5% phenylephrine appears to be a suitable alternative to topical cocaine for short procedures such as nasotracheal intubation.

References.

1. Hasegawa M and Kern EB: The human nasal cycle. Mayo Clin Proc 52: 28-34, 1977.
2. Hartigan ML, Cleary JL, Gross JB, Schaffer DW: Is nasal cocaine superior to a lidocaine-phenylephrine mixture for blind nasotracheal intubation? Anesth Analg 63: 227, 1984.

	Before Cocaine	After Cocaine	Before L/P	After L/P
Spirometry				
PEFR	6.6±2.0	7.4±1.6†	6.4±2.0	7.6±1.7*
Binasal Resistance				
Total	3.3±1.5	1.7±1.2*	3.2±2.1	1.7±1.1*
Inspiratory	3.4±3.3	1.7±1.4*	3.3±3.3	1.8±1.4†
Expiratory	3.0±1.5	1.7±1.2*	3.0±0.8	1.6±3.9Δ
Uninasal Resistance				
Closed	14.7±8.5	10.9±19.6#	26.2±47.7	8.7±10.2#
Open	5.6±3.4	4.9±4.2	6.0±2.8	4.8±3.8

Data expressed as mean ± S.D. Post-drug data compared to pre-drug data.

*p<0.001 †p<0.01 Δp<0.05

#p<0.05 Wilcoxon's rank-sum test

Downloaded from http://asa2.silverchair.com/anesthesiology/article-pdf/61/3/A216/629271/0000542-198409001-00216.pdf by guest on 09 April 2024