

Comparison of analgesic effect of tetracaine ophthalmic solution and lidocaine as a topical anesthesia for intranasal endoscopy

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Abstract

Objective: The aim of this study was to evaluate the efficacy of 0.5% tetracaine ophthalmic solution, compared with 10% lidocaine solution, as a local anesthetic agent for patients undergoing intranasal endoscopy.

Materials and Methods: A prospective study was conducted on patients undergoing intranasal endoscopy. Neurosurgical sponges soaked with anesthetic agents were applied into each side of the nose for 10-15 minutes before endoscopy. The patients were alternately allocated to receive 0.5% tetracaine solution in one side of nose and 10% lidocaine solution into the other side. Pain during the procedure was evaluated by a visual analog scale and statistically compared.

Results: This study consisted of forty patients. Total nasal pain score in tetracaine group was lower than lidocaine group but no statistically significance (30 vs 59, $P < 0.08$). No complications or adverse effects of tetracaine and lidocaine occurred. Most patients reported mild, temporary burning sensation in the nasal sites placed with 10% lidocaine but not with tetracaine.

Conclusion: Application of 0.5% tetracaine ophthalmic solution is an easy, safe, and effective analgesia for intranasal endoscopy.

Keywords: tetracaine, lidocaine, intranasal, endoscopy

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การเปรียบเทียบประสิทธิภาพของยาหยอดตา tetracaine กับ lidocaine ในการใช้เป็นยาชาเฉพาะที่สำหรับการส่องกล้องในจมูก

นิรันดร์ หุ่นฉายศรี

ภาควิชาโสต ศอ นาสิก ลาริงซ์วิทยา คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

บทคัดย่อ

วัตถุประสงค์: เพื่อประเมินประสิทธิภาพของยาหยอดตา 0.5% tetracaine เปรียบเทียบกับ 10% lidocaine ในการใช้เป็นยาชาเฉพาะที่สำหรับการส่องกล้องตรวจในจมูก

วิธีศึกษา: เป็นการศึกษาแบบไปข้างหน้าในผู้ป่วยที่ได้รับการตรวจด้วยการส่องกล้องตรวจในจมูก โดยใช้แผ่นสำลีชุบยาชาใส่ไว้ในจมูก ทิ้งไว้ 10-15นาทีก่อนการตรวจ จมูกด้านหนึ่งจะได้ tetracaine ในขณะที่อีกด้านหนึ่งจะได้ lidocaine ความเจ็บปวดที่เกิดจากการตรวจจะถูกประเมินด้วย visual analog scale และนำไปวิเคราะห์ค่าทางสถิติ

ผลการศึกษา: มีผู้เข้าร่วมวิจัยจำนวน 40 คน พบว่าความเจ็บปวดในกลุ่มที่ได้ยา tetracaine มีค่าน้อยกว่ากลุ่มที่ได้ยา lidocaine แต่ไม่มีนัยสำคัญทางสถิติ (30 ต่อ 59, $p < 0.08$) ไม่พบภาวะแทรกซ้อนหรือผลข้างเคียงจากยา พบเพียงอาการเจ็บแสบชั่วคราวในจมูกด้านที่ได้ lidocaine ในผู้ป่วยเกือบทุกรายแต่ไม่พบในด้านที่ได้ tetracaine

สรุป: การใช้ยาหยอดตา 0.5% tetracaine เป็นวิธีที่ง่าย, ปลอดภัยและมีประสิทธิภาพ ในการใช้เป็นยาชาเฉพาะที่สำหรับการส่องกล้องตรวจในจมูก

Introduction

Nasal examination is basically performed under direct light and a speculum. An accurate diagnosis might be impossible when visualization of internal nasal structures such as turbintes or meatus, can't be accomplished. The anatomy of the nasal passages is well observed by intranasal endoscopy (fiber-optic or rigid) under local or topical anesthesia.

Cocaine, lidocaine and tetracaine are commonly used as topical anesthetic agents. Cocaine has been used as topical nasal anesthesia for more than 100 years¹. It was favored by otolaryngologists because of its anesthetic and inherent vasoconstrictor properties at clinical doses^{1,2}. However, the routine use of cocaine has been deminished because of abuse potential, side effects, and availability restrictions^{3,4}. For these reasons, lidocaine and tetracaine were alternatively used as topical anesthetics for intranasal procedures. Tarver et al⁵ have shown that no difference exists between the intranasal anesthetic or vasoconstrictive effects of cocaine and those of a lidocaine-oxymetazoline mixture. The local intranasal anesthetic effect

of tetracaine solution has been already proven superior to that of lidocaine^{6,7} and cocaine^{8,9}. The concentration of tetracaine solution used in these reports are usually 1% or 2%. According to the drug information, tetracaine 0.5% is also recommended that can be used in rhinolaryngologic examinations. Profound anesthesia lasting 30 minutes is obtainable either by direct application of 0.5% solution or by oral inhalation of nebulized 0.5% solution.

The purpose of this study was to compare the efficacy of 0.5% tetracaine solution and lidocaine 10% solution for anesthetic effect in intranasal endoscopy.

Materials and methods

From January 2010 to December 2010, a prospective, single-blinded, controlled trial was performed in the patients who met the following criteria (Table 1). A total of 40 patients were enrolled into the present study, which was approved by the Ethics Review Boards of the Faculty of Medicine, Srinakharinwirot University.

Table 1 Criteria of the study

Inclusion criteria
1. Patient's age 18 years or more
2. Patients who accept the examination by rhinoscope and sign the written informed consent
Exclusion criteria
1. History of allergy to tetracaine or lidocaine
2. Patients who had nasal pathology that rhinoscope can't be passed
3. Pregnancy and nursing women
4. Psychiatric patients
Discontinuation criteria
1. Allergy or adversed effects to drugs
2. Severe pain or syncope during the procedure

Nasal endoscopy technique

Two neurosurgical sponges (80 x 10 mm) soaked with anesthetic agents were applied in each side of the nose. The first sponge was placed along the medial surface of the inferior turbinate. The second was applied over the surface of the inferior turbinate and into the middle meatus. Each anesthetic agent was randomly used in each nasal cavity. Once tetracaine was used in one side, then lidocaine was used in the other side. In one side, two neurosurgical sponges soaked with a mixture of 3 mL of tetracaine 0.5% solution (total dose, 15 mg) and 1 mL of ephedrine 1% and completely wrung were inserted. In the other side, a mixture of 12 puffs of lidocaine spray 10% (total dose,

120 mg) and 1 mL of ephedrine 1% was used.

The neurosurgical sponges had been left into the patient's nose for 10-15 minutes before the endoscopy. A rigid, 0 or 30 degree, 4.0-mm diameter rhinoscope was used. Nasal endoscopy was done by inserting the rhinoscope over the inferior turbinate into the middle meatus. Scope was passed until the posterior choana was seen. Patients were requested to evaluate the intensity of the pain they experienced during the procedure, using a visual analog scale (range, 0-10, where 0 = no pain and 10 = intolerable pain). Any discomfort or adversed symptom was also recorded. Wilcoxon signed-rank tests were used for statistical analysis. The criterion for statistical significance was $P < 0.05$.

Results

Forty patients were enrolled in the present study. There were no serious complications. Only mild and transient burning sensation in the nasal side placed with lidocaine were reported by nearly all subjects. Demographic characteristics of the patients were shown in Table 2. Common

diseases were allergic rhinitis (60%), chronic rhinosinusitis (47.5%), and nasal polyp (37.5%). Total score (mean \pm SD) on visual analog scale were 35 (0.88 \pm 1.38) in the tetracaine side and 59 (1.48 \pm 1.89) in the lidocaine side. This difference was no statistical significance ($P = 0.08$) (Table 3).

Table 2 Baseline characteristics of patients

AGE(years)	
-mean \pm SD	50.5 \pm 13.53
-Range	18-72
GENDER(male:female)	28:12
DIAGNOSIS(number of cases)(%)	
-Allergic rhinitis	24 (60)
-Chronic rhinosinusitis	19 (47.5)
-Nasal polyps	15 (37.5)
-Deviated septum	3 (7.5)
-Nasal tumor	1 (2.5)

Table 3 Comparison of VAS between two groups

	Tetracaine group	Lidocaine group	P
VAS: total	35	59	
: mean \pm SD	0.88 \pm 1.38	1.48 \pm 1.89	0.08

Data are given as mean \pm standard deviation (SD). VAS = Visual analog scale,
P = Wilcoxon signed-rank test.

Discussion

Nasal endoscopy is necessary for otolaryngologists in accurate diagnosis of the nose and paranasal sinuses diseases. This was usually done under local anesthesia with topical anesthetic agents. Cocaine has been used for many years as a local anesthetic but has decreased significantly due to abuse potential, side effects, and availability restrictions as previously mentioned. Few other local anesthetics have been used to replace cocaine. These are lidocaine and tetracaine which have to mix with vasoconstrictors to produce the same anesthetic and decongestion effect as cocaine. Tarver et al⁵ had compared the effectiveness of combination of lidocaine and oxymetazoline (lido/oxy) to cocaine in providing intranasal anesthesia and vasoconstriction. They found a greater decrease in blood flow after the administration of lido/oxy than after the administration of cocaine. Pain perception change was not significantly different between two treatment groups. They concluded that lido/oxy can be used instead of cocaine. Noorily et al⁶ had conducted a double-blind, randomized study to compare the quality of nasal anesthesia obtained with 2% lidocaine in oxymetazoline and 1% tetracaine in oxymetazoline. They found that subjects had greater decreases in pain perception with tetracaine than with lidocaine at 10 and 70

minutes time intervals [$p = 0.0003$ and $p < 0.0001$, respectively]. They concluded that tetracaine mixed with oxymetazoline appears to be a superior topical anesthetic for nasal procedures. Bourolias et al⁷ had performed a prospective study to evaluate the efficacy of lidocaine spray 10%, compared with tetracaine 2% solution, as a local anesthetic for patients undergoing transnasal fiber-optic laryngoscopy. The study had revealed significant lower mean nasal discomfort score in favor of the tetracaine group (2.29 vs 3.04 [$P < .001$]). Drivas et al⁸ and Bizakis et al⁹ had also demonstrated that topical tetracaine is effective and safe for anesthesia of the nasal mucosa in septoplasty.

Taking into consideration the results from these studies, tetracaine seem to be better or at least equal to lidocaine and cocaine in intranasal anesthetic effect. The concentration of tetracaine used in previous studies are 1-2% which differs from the present study, 0.5%. However, the result from the present study still showed that pain score in the nasal sides packed with tetracaine was lower than in the sides packed with lidocaine but no statistical significance ($P = 0.08$).

Although there was no complications occurred in the present study, it was safer not to use tetracaine more than the recommended maximum dose of 1 mg/kg. There was a

report discussed fatalities that occurred after the topical application of local anesthetics to mucous membranes, and most of these cases involved tetracaine. In most of the tetracaine fatalities, the dose exceeded 100 mg¹⁰. The dose of tetracaine used in the present study was 15 mg which was much lower than the maximum dose and the dose of lidocaine was 120 mg which is lower than the recommended maximum dose of 200 mg¹¹. These doses can yield desirable anesthetic effect without a risk of severe complications. Another advantage of tetracaine found from the present study is no burning sensation when packing. On the other hand, nearly all subjects reported mild, transient burning sensation with lidocaine packing.

Conclusions

Analgesic property of tetracaine is superior to lidocaine and tetracaine does not cause transient burning sensation like lidocaine. Application of 0.5% tetracaine ophthalmic solution is an easy, safe, and effective anesthetic for intranasal endoscopy.

References

1. Verlander MJ, Johns ME. The clinical use of cocaine. *Otolaryngol Clin North Am*1981;14:521-31.
2. Johns ME, Henderson RL. Cocaine use by the otolaryngologist: a survey. *Trans Am Acad Ophthalmol Otolaryngol* 1977;84: 969-73.
3. Fairbanks DN, Fairbanks GR. Cocaine uses and abuses. *Ann Plast Surg* 1983;10:452-7.
4. Chiu YC, Brecht K, DasGupta DS. Myocardial infarction with topical cocaine anesthesia for nasal surgery. *Arch Otolaryngol Head Neck Surg* 1986;112:988-90.
5. Tarver CP, Noorily AD, Sakai CS. A comparison of cocaine vs. lidocaine with oxymetazoline for use in nasal procedures. *Otolaryngol Head Neck Surg* 1993;109: 653-9.
6. Noorily AD, Otto RA, Noorily SH. Intranasal anesthetic effects of lidocaine and tetracaine compared. *Otolaryngol Head Neck Surg* 1995;113:370-4.
7. Bourolias C, Gkotsis A, Kontaxakis A, Panagiotis Tsoukarelis P. Lidocaine spray vs tetracaine solution for transnasal fiberoptic laryngoscopy. *Am J Otolaryngol* 2010;31:114-6.

8. Drivas EI, Hajjiannou JK, Lachanas VA, et al. Cocaine versus tetracaine in septoplasty: a prospective, randomized, controlled trial. *J Laryngol Otol* 2007;121:130-3.
9. Bizakis JG, Lachanas VA, Drivas EI, et al. Cocaine flakes versus tetracaine/adrenaline solution for local anaesthesia in septoplasty. *Rhinology* 2004;42:236-8.
10. Adriani J, Campbell D. Fatalities following topical application of local anesthetics to mucous membranes. *JAMA* 1956;162:1527-30.
11. National Organizations for Medicines. Greek National Formulary 2003;651-2.