

INTRODUCTION

Dental treatment often necessitates the use of local anesthesia (LA) to achieve patient comfort and anxiolysis. LA injections are frequently uncomfortable. Achieving profound anesthesia while minimizing pain on administration helps patients have positive experiences with the dentist and can reduce anxiety.¹ It has been reported that neutralizing the acidic local anesthetic using Sodium Bicarbonate may reduce patient pain perception associated with administration of local anesthesia and decrease the onset time of the drug.^{2,3} Few studies have focused on treatment for pediatric dental patients, and the results of various studies have had mixed results.^{1, 2, 3, 4}

OBJECTIVES

- The aim of this study is to determine if:
- 1. There is a statistically significant difference in pain perception between conventional 2% lidocaine with 1:100,000 epi and a buffered lidocaine solution
 - 2. There is faster onset time of soft tissue anesthesia with conventional 2% lidocaine with 1:100,000 epi versus a buffered lidocaine solution

Inclusion Criteria	Exclusion Criteria
ASA I or II	Known allergy to LA or components
Children 4-17 years of age	Medical contraindications to epinephrine
Ability to receive LA without sedation or anxiolysis	History of adverse reaction to epinephrine
Needs treatment on 2 sides of the mouth, same arch	Nursing or pregnancy
Parent/guardian can read and write in English	Inability to keep dental appointments

Table 1. Inclusion and Exclusion Criteria

METHODS & MATERIALS

This project was designed as a longitudinal, double-blind, crossover study. Table 1 lists the inclusion and exclusion criteria for participants entering the study. Figure 1 details the participants' process in the study from recruitment through data analysis. Consent and treatment were completed by a single pediatric dental resident under the direct supervision of a board-certified pediatric dentist. On the day of treatment, the chief complaint or side with more dental disease was treated first.

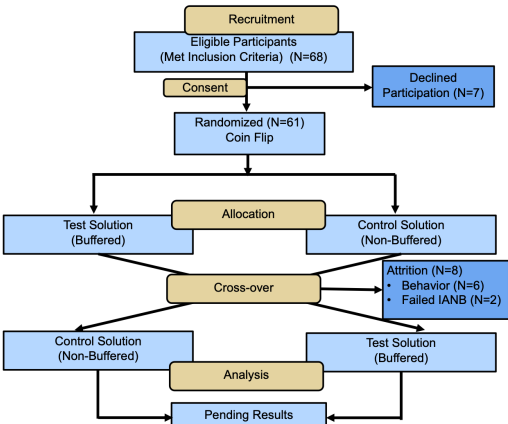


Figure 1. Participant Flow Chart

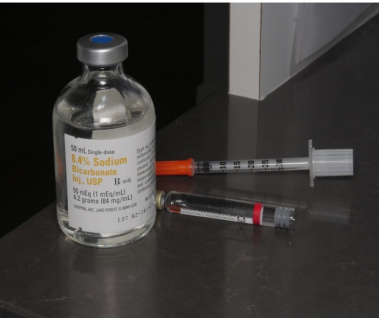


Figure 2⁵

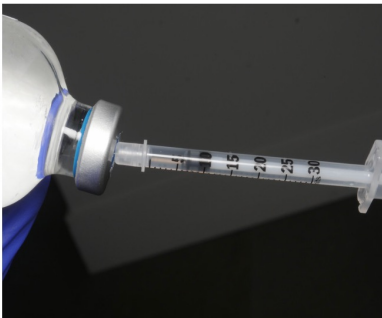


Figure 3⁵



Figure 4⁵



Figure 5⁵

Figure 2. Armamentarium: 1.7mL cartridge of 2% lidocaine with 1:100,000 epinephrine, 8.4% Sodium Bicarbonate (NaHO₃) vial, and a diabetic syringe. Figure 3, 4 Withdrawing 0.17mL of NaHCO₃ and injecting into cartridge of LA. Figure 5. Extruded stopper after addition of NaHCO₃.⁵

The type of LA was randomized via coin flip without the presence of the resident to maintain blinding. Figures 2-5 show the preparation of the buffered solution. Baseline pain perception was documented using the Wong- Baker FACES scale (Figure 6). After administration of LA, participants scored their pain perception using the FACES scale again. The provider scored each participant using the FLACC scale (Table 2). Lastly, a periodontal probe was used to determine onset of soft tissue anesthesia by probing the sulcus of the anesthetized tooth/teeth in 15 second intervals. Patients returned after no less than 1 week for treatment on the other side of the mouth with the alternate LA solution.



Figure 6 Wong-Baker FACES Scale.

BEHAVIOR	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, backs and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams, sobs, frequent complaints
Consolability	Content, relaxed	Reassured by touching, hugging or being talked to, distractible	Difficult to console or comfort

Table 2. FLACC Scale

RESULTS

Fifty-five patients aged 4-17 were recruited for this study. 14 patients were removed from the study, mostly due to anxiety to the dental setting. The majority of the subjects had the lowest baseline FACES score (96.4%), and the frequency of each category was identical between the buffered and non-buffered groups. Patients in the non-buffered group were more likely to have a lower FACES score during injection compared to the buffered group (65.4% vs 56.4%, p = 0.017). The change in FACES scores from baseline to injection was also identical between the two groups, with the majority of the subjects feeling worse (75.5%) during the injection. The time of onset and FLACC total score showed no significant difference between the two groups.

	Buffered N = 55	Non-buffered N = 55	p-value
Baseline Faces, n (%)			-
0-2	53 (96.4%)	53 (96.4%)	
4-6	2 (3.6%)	2 (3.6%)	
8-10	0 (0)	0 (0)	
Injection Faces, n (%)			0.017 ¹
0-2	31 (56.4%)	36 (65.4%)	
4-6	15 (27.3%)	11 (20.0%)	
8-10	9 (16.3%)	8 (14.6%)	
Time of Onset, seconds			0.399 ²
Median (IQR)	60 (15, 120)	60 (30, 120)	
Range	15, 420	15, 615	
FLACC Total			0.644 ²
Median (IQR)	1 (0, 5)	1 (0, 5)	
Range	0, 8	0, 9	

¹Cochran-Mantel-Haenszel test; ²Wilcoxon Singed-Rank test; *IQR = Interquartile range.
Table 3. Difference in baselines face score, injection face score, onset time, and FLACC total score

CONCLUSIONS

The results of this study suggest that using a buffered lidocaine solution did not reduce patient pain during injection or onset time to anesthesia in any statistically significant way.

References

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