

The Effect of Local Anesthesia When Used in Dental Restorative Cases Under General Anesthesia on Postoperative Comfort

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Purpose

- The purpose of this study is to determine the effect of local anesthesia on postoperative comfort in patients who underwent restorative dental treatment under general anesthesia.
- The study is important because there are currently no specific guidelines for dental practitioners regarding the use of local anesthetic in dental cases under general anesthesia.

Introduction

- General anesthesia (GA) is defined as a drug-induced loss of consciousness during which the patient is not arousable, even by painful stimulation.¹ The American Academy of Pediatric Dentistry (AAPD) has accepted GA as a behavior management technique to accomplish extensive dental treatment in young or pre-cooperative children.²
- Local anesthesia (LA) is the temporary loss of sensation including pain in one part of the body produced by injecting an agent without loss of consciousness.³
- LA is routinely used in both medical and dental practices to prevent pain in a local area during a procedure as well as postoperatively.³
- The concept of LA usage during dental surgeries under GA is a relatively new regarding the realm of pain control.⁴
- A reason to use LA for dental procedures under GA is the reduction in postoperative pain, but there are concerns of increased risk of postoperative soft tissue trauma while the patient is numb.⁵ Postoperative pain reported was more intense as the number of dental procedures performed increased.^{6,7}
- Following dental treatment under GA, most patients (68-74%) report pain or discomfort.⁸
- Pediatric dental providers have a responsibility for anticipating and appropriately managing dental pain in children following dental treatment under GA.⁹ Pain in the pediatric population is difficult to assess and often underestimated by parents.^{10,11} Observational evidence suggests behavioral pain scores such as posture-related scales: Faces, Legs, Activity, Cry and Consolability (FLACC) can be used in assessing pain in children who cannot self-report and is one of the most widely used pain scales in children.¹²



Materials & Methods

- This study was modeled as a double-blinded randomized control trial and the methods were adapted from the pilot study performed by Skarda et al.¹³
- Patients included were healthy children under the age of 6 years, American Society of Anesthesiologists (ASA) category 1 or 2 without any history of behavioral diagnoses who had been treatment planned to have restorative treatment including prefabricated crowns, pulp therapy, space maintainers and the use of rubber dam clamps for isolation.
- Dental treatment was performed under GA at the Children's Hospital of Richmond at VCU Brook Road and Children's Pavilion Campuses.
- Day of surgery, patients were evaluated preoperatively using the FLACC Behavioral Scale by a trained nurse who was blinded to the candidates' group in the study.

FLACC Behavioral Scale

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

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between zero and ten.

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- Intraoperatively, participants followed a standardized GA protocol.
- Patient treatment group was not disclosed to the dental surgeon and anesthesiologist until the start of surgery via a sealed envelope. Patients randomized to the LA group followed a standardized LA protocol and were given 2% Lidocaine with 1:100,000 epinephrine at all six sites (L posterior, anterior, R posterior on each arch) of the mouth by the dental surgeon performing the surgery of potentially stimulating treatment up to a max dose of 2.2mg/kg administered 10 minutes prior to the end of the procedure. Patients in the no LA group did not receive LA or placebo medication.
- Postoperatively, patients were evaluated in the Post Anesthesia Care Unit (PACU) by a nurse blinded to the intervention before discharge using the FLACC scale. Patient's time in PACU was noted upon discharge.
- The evening of the procedure, parents were asked to evaluate their children over the phone using a parent administered Parent's Postoperative Pain Measure (PPPM), which is a 15-item questionnaire validated to assess postoperative pain in children based on objective behaviors indicative of pain demonstrated by a child that can be readily accessed by their parent.^{14,15}
- Results were summarized with counts and percentages and means and standard deviations. Bivariate associations with postoperative distress and PPPM were assessed using Fisher's Exact test. Differences in PACU time were compared using Wilcoxon rank-sum test and differences in proportion of patients demonstrating distress at 30 minutes postoperative was assessed using Fisher's exact test. Significance level was set at 0.05.

PARENTS' POSTOPERATIVE PAIN MEASURE (PPPM)

Children sometimes have changes in behavior when recovering from surgery. The following is a list of behaviors that your child may or may not have exhibited while recovering from surgery between _____ and _____ today. For each of the behaviors below, circle the appropriate response, yes or no.

When your child was recovering from surgery between _____ and _____ today, did she ...

- Whine or complain more than usual? Yes No
- Cry more easily than usual? Yes No
- Play less than usual? Yes No
- Not do the things she normally does? Yes No
- Act more worried than usual? Yes No
- Act more quiet than usual? Yes No
- Have less energy than usual? Yes No
- Refuse to eat? Yes No
- Eat less than usual? Yes No
- Hold the sore part of his/her body? Yes No
- Try not to bump the sore part of his/her body? Yes No
- Groan or moan more than usual? Yes No
- Look more flushed than usual? Yes No
- Want to be close to you more than usual? Yes No
- Take medication when she normally refuses? Yes No

Results

- A total of 31 children participated in the study. The patient population is summarized in Table 1. The two groups were similar in terms of demographics except for race/ethnicity.

	Total	
	n	%
Local Anesthesia	Yes	15 48%
	No	16 52%
Age	2	2 9%
	3	7 32%
	4	7 32%
	5	6 27%
	6	6 27%
Gender	Male	14 64%
	Female	8 36%
	Did not Disclose	0%
Race/Ethnicity	African American/Black	10 45%
	Hispanic	6 27%
	White	5 23%
	Not Disclosed	1 5%
		1 5%

Table 1: Patient Characteristics Overall

- The average number of teeth treated was 8 and ranged from 2 to 15.
- The average procedure time was 77.3 minutes. The average postoperative recovery time was 39.9 minutes.
- There was a marginally significant difference in procedure time, with the LA group requiring longer procedure times (average of 85.4 minutes) than the no LA group (average of 70.6 minutes) (p-value=0.0573). PACU time did not differ significantly between the two groups (p-value=0.3289).

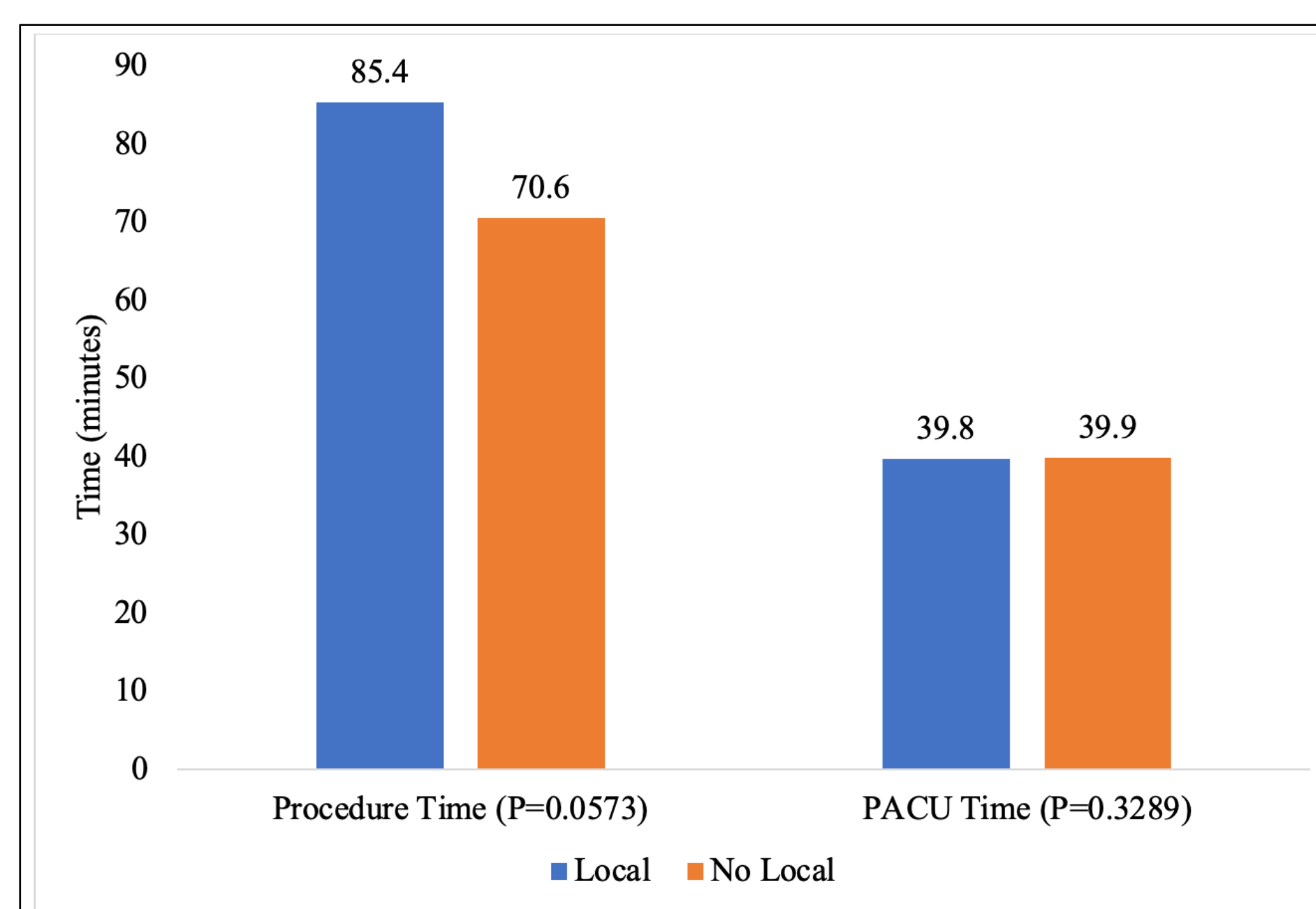


Figure 1: Procedure Time and PACU Time

- Preoperatively, only 10% of patients demonstrated any level of distress and this did not differ significantly between the two groups.
- Postoperatively, 35% demonstrated distress.
- 19% of those who did not have LA demonstrated distress compared to 53% of those who did have LA. The number of teeth treated was dichotomized into 8 or more and less than 8 teeth and demonstrated a significant association with postoperative distress (p-value=0.0309). Among those with less than 8 teeth treated, 57% demonstrated distress compared to 18% of those with 8 or more teeth treated as summarized in Figure 2.
- None of the variables considered demonstrated a significant association with a positive PPPM score. Although not statistically significant, among those who did not receive local anesthesia, 69% had positive PPPM scores compared to 40% of those who did receive local (Figure 1, p-value=0.2215).

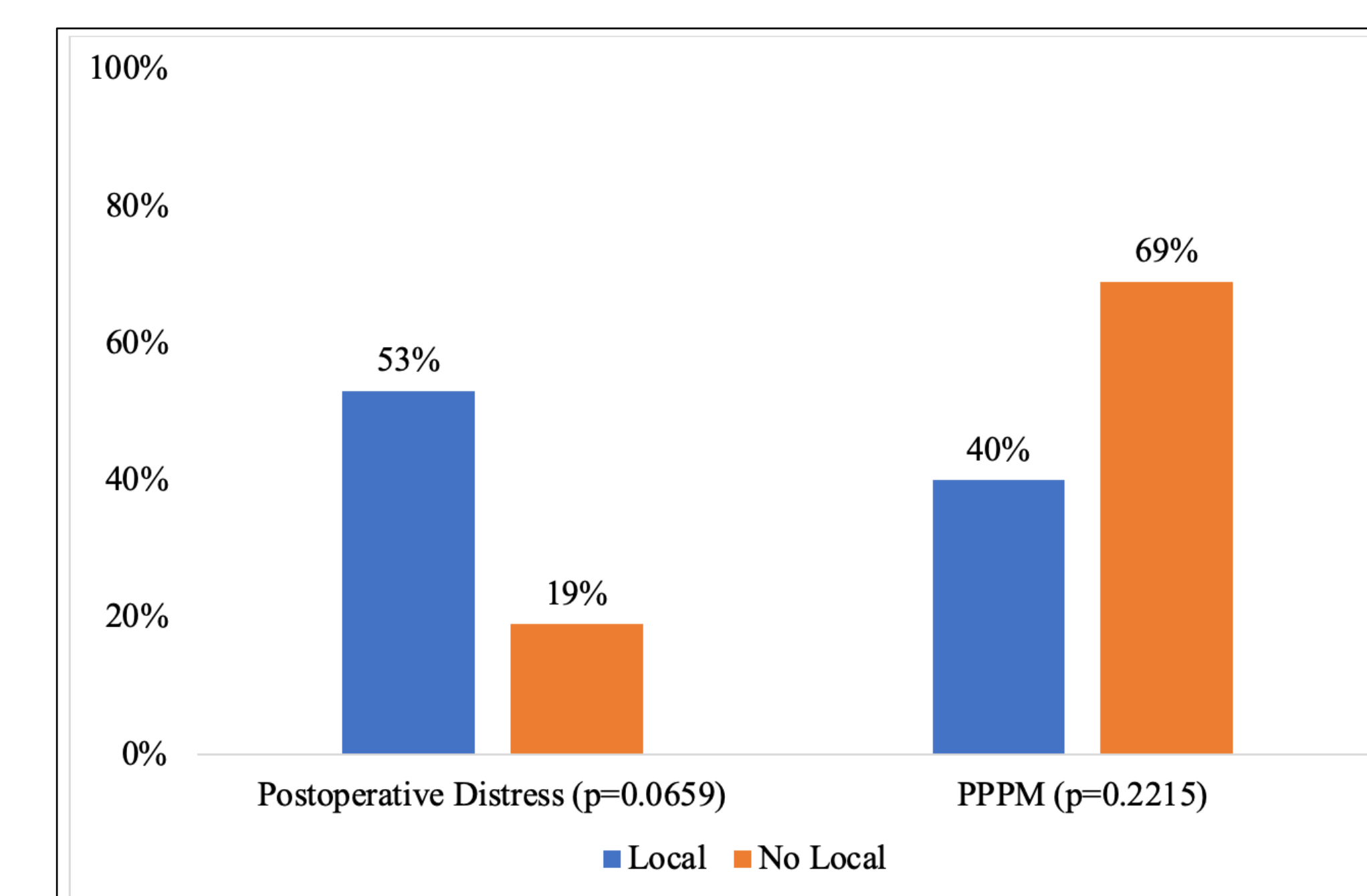


Figure 2: Bivariate Analyses with Postoperative Distresses and PPPM

Discussion

- At the time of GA, the amount of dental restorative treatment and the number teeth treated can vary widely from patient to patient depending on patient needs.
- In this study, patients with less than 8 teeth treated, 57% demonstrated distress compared to 18% of those with 8 or more teeth treated, which does not correlate with other studies specifically by the study by Needleman et al.⁷ It can be hypothesized that children with extensive dental caries have experienced dental pain over a long period of time which desensitizes them more to postoperative distress compared to children with less extensive dental needs and were not experiencing pain prior to surgery. This hypothesis correlates with a study by Marvin et al., which evaluated the relationship between severe dental caries and mouth pain.¹⁶
- Patients who received LA were marginally more likely to demonstrate distress than those who did not receive LA although no significant difference. The findings of increased postoperative distress with LA align with the study by Al-Bahlani et al.¹⁷ Wong et al. noted that patients receiving dental treatment under general anesthesia have moderate to severe level of postoperative pain, which we found consistent in this study as noted by distress levels over zero.¹⁸
- In this study, patients who received LA displayed increased short-term distress after the dental procedure under GA at 30 minutes postoperatively while the patient was experiencing the numbness sensation and less long-term distress/ discomfort after dental surgery under GA which was taken 6-9 hours after the time of the dental procedure. Due to the working time of the local anesthesia administered, the numbing sensation had dissipated once the postprocedural call and PPPM score was taken.¹⁹ The hypothesis of increased postoperative distress attributing to the sensation of numbness correlates with the findings of the study by Townsend et al. which evaluated various recovery characteristics in children undergoing dental procedures under GA.²⁰ This finding explains the reasoning for the increased postoperative distress levels and lower PPPM scores in patients that received LA.

Conclusion

- The use of LA in dental surgery under GA demonstrated a trend towards increased postop distress. This finding was hypothesized to be connected to patient irritability towards numbness sensation.
- The administration of LA did not affect the recovery time postoperatively.
- The procedure time was marginally significantly related to the treatment.
- The number of teeth treated showed a statistically significant difference related to postoperative distress, which could be attributed to the patient population being more desensitized to pain due to extensive caries and dental pain prior to surgery.
- Patients among the group that did receive LA demonstrated a lower PPPM score in comparison to the group that did not receive LA demonstrating less discomfort later that evening rather than immediately after the procedure. This could be contributed to less irritability from the diminished numbness sensation of local anesthesia at the time of the evening phone call to the parent/guardian of the patient to obtain the PPPM.

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