# Efficacy of Intraosseous Injections on Anesthetic Efficacy as Compared to Local Infiltration Injections in the Pediatric Dental Population

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## Introduction

Intraosseous injections have the potential to be the next major innovation with regards to anesthetic procedures. Due to rapid onset time, more approachable appearance to the patient, and favorable efficacy of anesthetic, they show promising development in dentistry. Previous studies have been performed on permanent dentition, particularly in cases with third molar extractions. However, little has been studied on this technique for pediatric patients and for primary teeth. Since the fear of needle injection can cause avoidance behavior in children, intraosseous injection may alleviate those fears. Intraosseous injections could be the new standard of care in pediatric dental offices, but more information is needed with regard to its efficacy. The primary objective of this study is to determine whether there is an increase in anesthetic efficacy when using intraosseous injections compared to local infiltration injections as measured by a cold test.

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## Materials

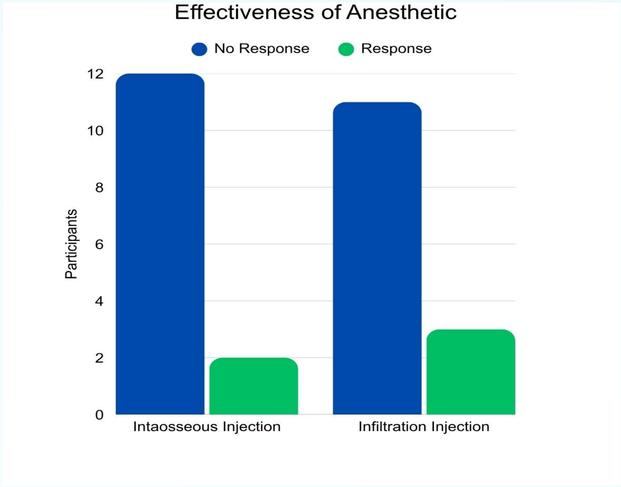
Materials for the local infiltration technique included a syringe and 0.8mL of Lidocaine (2% Lidocaine and Epinephrine 1:100,000). Instruments for the intraosseous injection technique included the SOAN Dental Hitec cordless electronic injection device, Effitec needle, connected foot pedal. Instruments for the cold test included cotton pliers, cotton pellets, and Endo Ice Refrigerant Spray.

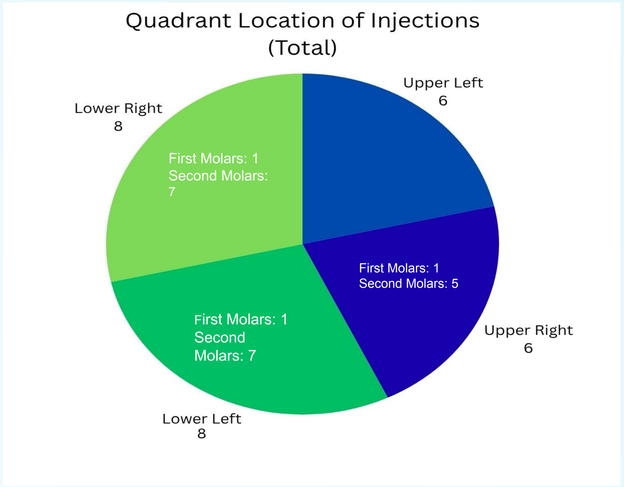
## Methodology

This was an interventional study comparing patient reaction to a cold test when given an intraosseous injection versus a local infiltration injection. The two interventions were performed on opposite sides of the mouth, but in the same arch for each study participant. Population included patients ages 8-12 who had a Frankl score rating of 3 or 4 upon their initial hygiene exam. Qualifying criteria included a treatment plan of one class I or II restoration on each side of the mouth for a primary first or second molar and the symmetrical tooth on the opposite side in the same arch. N20 was not used as it was a confounding variable. Each intervention was randomized to a right or left quadrant for each patient in order to have a distribution of intraosseous injections and local infiltration injections on the left and right sides. The patient's reaction during the cold test was recorded after approximately 3 minutes, along with the tooth numbers treated and the quadrants treatment occurred in.

## Results

A total of 14 pediatric patients met inclusion criteria for this study. Anesthetic success, which involved in response upon Cold Test, was achieved in 12 of 14 (85.7%) intraosseous injections and 11 of 14 (78.6%) local infiltration injections. Paired outcome analysis demonstrated that 9 patients experienced successful anesthesia with both techniques, while no patients experienced failure with both techniques. Among discordant pairs, injections resulted in successful anesthesia in 3 cases where infiltration failed, whereas infiltration injections were successful in 2 cases where IO failed. A McNemar's test was performed to compare anesthetic efficacy between the two techniques. There was no statistically significant difference between intraosseous and local infiltration injections (p = 1.00). These findings indicate a higher observed success rate for intraosseous injections; however, this difference did not reach statistical significance.




## Discussion and Conclusion

This study did not show statistical significance. Major limiting factors included small sample size, with strict inclusion criteria regarding age, behavior, and identical treatment on both sides of the mouth. Patients fitting inclusion criteria often required treatment under full sedation, which also limited the amount of participants. Study size was also limited by behavior, as two participants were unable to tolerate a multi-quad treatment in one visit. No difference was seen in behavior between the two injections for any of the fourteen patients. Although there was no statistically significant difference found in this study, intraosseous injection remains an promising treatment option for the pediatric dental setting. Results from this study suggest intraosseous injections are comparative in efficacy to the traditional infiltration method. They may be beneficial for patients who have lower Frankel scores and poor tolerance of procedures.

Future studies could include a large participant group. As primary teeth have limited alpha-delta fibers, a study focused on permanent teeth may provide more accurate results when performing the Cold Test.

## References