

Introduction

Pain during dental treatment is a major etiological factor in behavior-management problems and development of dental anxiety.^(1,2) The prevalence of ineffective local anesthesia (LA) in children varied from 5% - 35% of cases in different reports and it is even higher (up to 67%) when performing invasive treatments such as stainless-steel crowns (SSCs), pulp treatments or extractions.^(3,4) No data is available regarding the type and effectiveness of secondary and tertiary LA during routine dental treatment in children.

Purpose

To evaluate the effectiveness of primary, secondary and tertiary LA in routine dental treatments in children.

Methods

Dental records analysis of all children (2-18 y.o) who received LA for treatment of primary/permanent molars by one pediatric dentist, between 2011-2022. All children received LA using The Wand® STA, a computer-controlled local anesthetic delivery system (CCLAD) [Fig. 1]. Maxillary molars were anesthetized by buccal-infiltration [Fig. 2] or by intra-ligamental anesthesia (IL-CCLAD) [Fig. 3]. Mandibular molars were anesthetized by inferior alveolar nerve block (IANB) [Fig. 4] or by IL-CCLAD. The effectiveness of LA was evaluated separately for the first (\bar{D}/\underline{D}), second primary molars (\bar{E}/\underline{E}), and first permanent molars ($\bar{6}/\underline{6}$) in the maxilla and in the mandible [Table. 1]. Only one molar from each child was analyzed in each group of teeth.



Fig. 1 Wand® STA

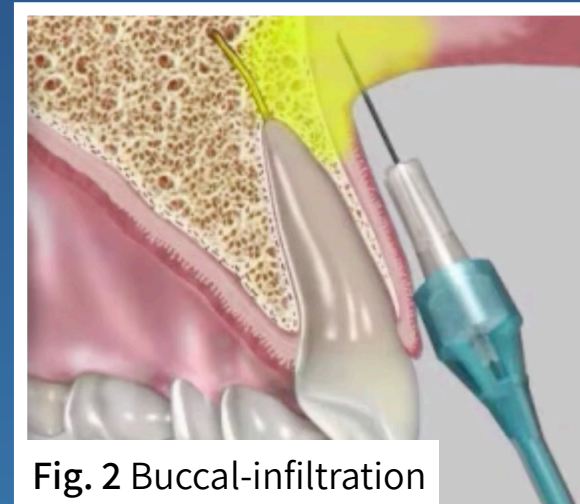


Fig. 2 Buccal-infiltration

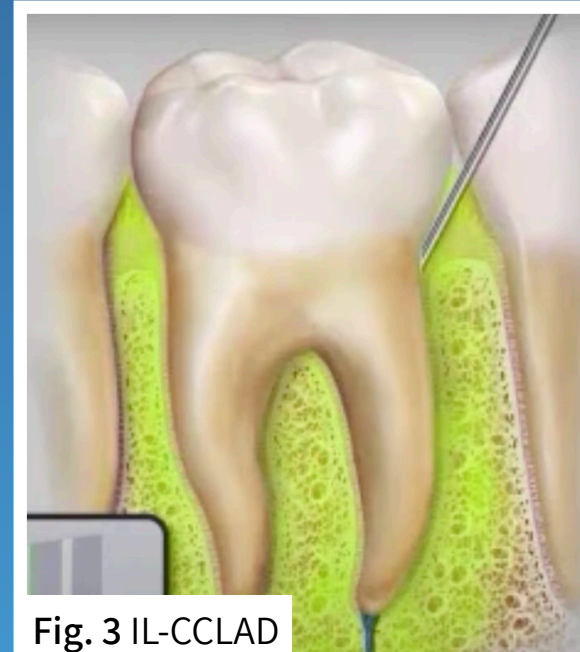


Fig. 3 IL-CCLAD

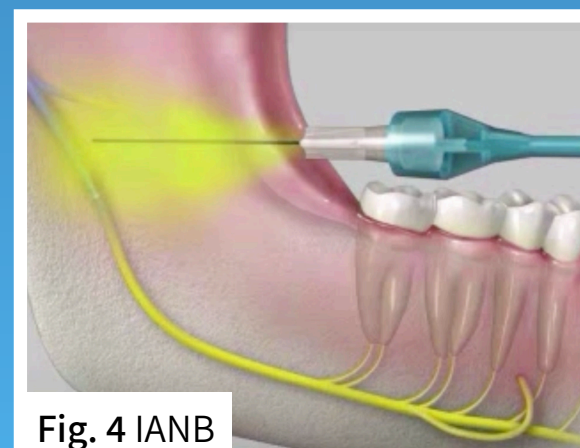


Fig. 4 IANB

Fig 5. Effectiveness of primary local anesthesia for dental treatment in children according to treated tooth

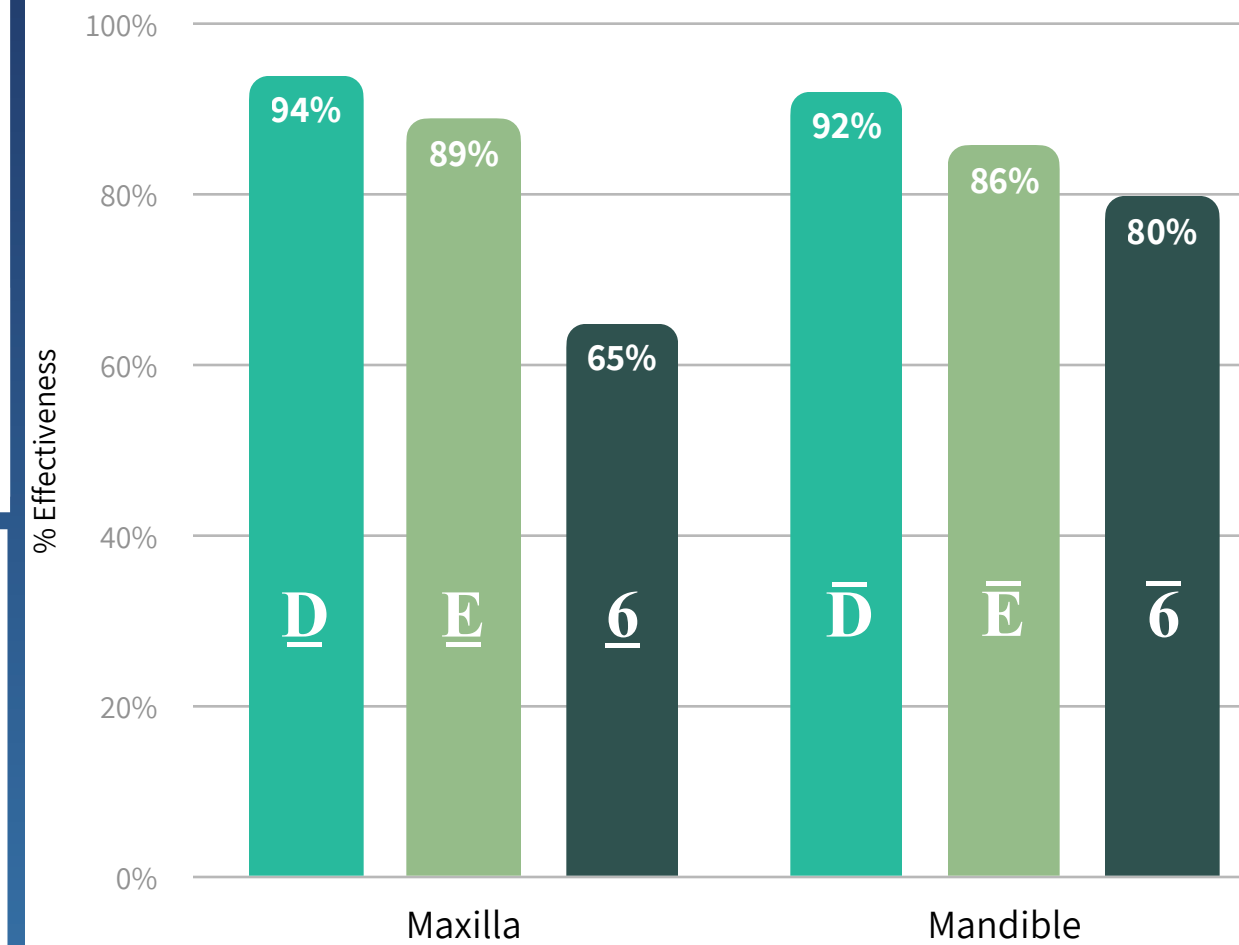


Fig 6. Effectiveness of different types of secondary local anesthesia

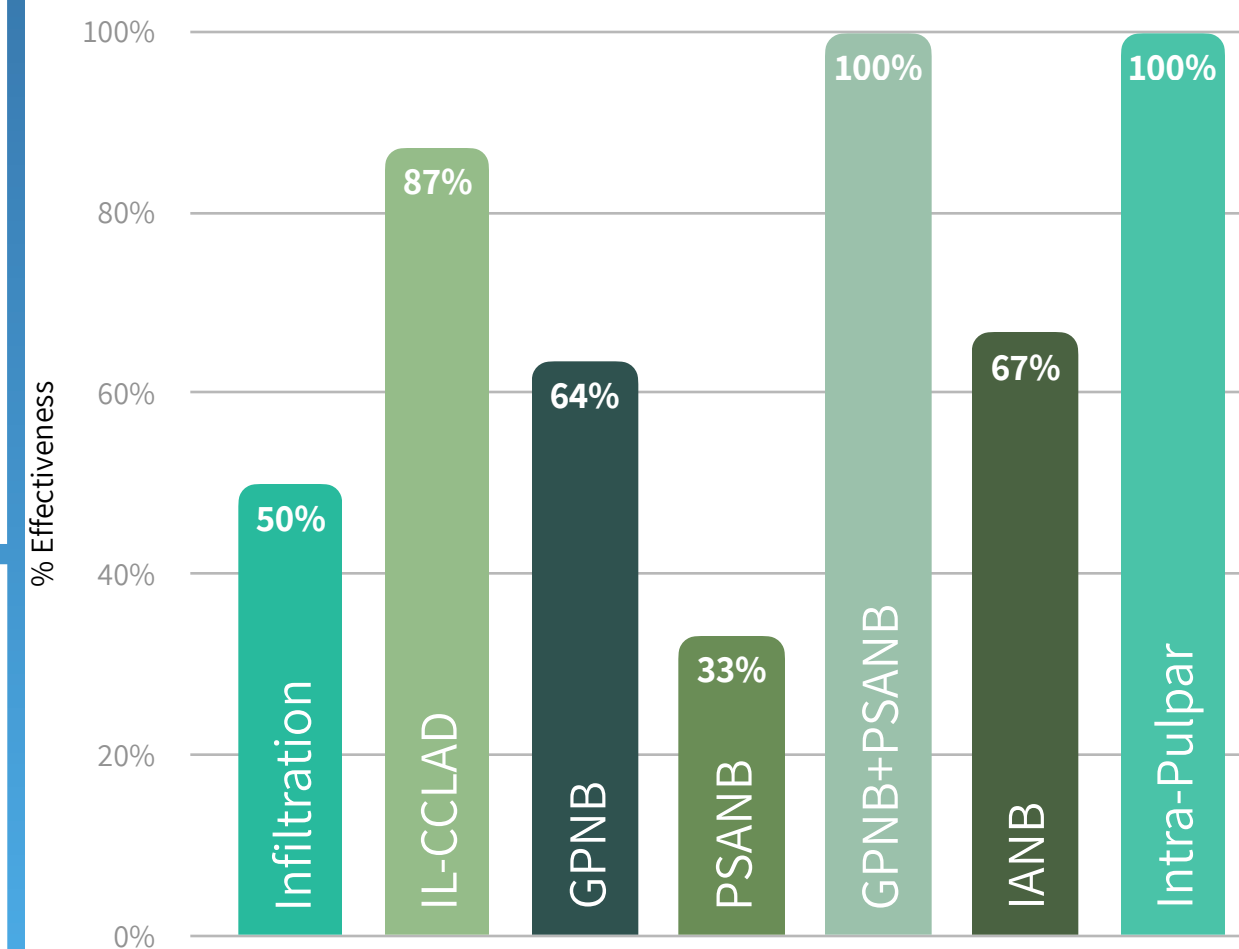


Table 1. Effectiveness of primary local anesthesia according to treated teeth

	Results	O.R (95% CI)	P-value
$\bar{6}$ vs. $\underline{6}$	$\bar{6}$ (65.1%) < $\underline{6}$ (79.9%)	2.12 (1.2 - 3.75)	P=0.01
$\bar{6}$ vs. $\underline{D}, \underline{E}$	$\bar{6}$ (65.1%) < $\underline{D}, \underline{E}$ (91.6%)	5.65 (3.4 - 9.34)	P<0.001
$\bar{6}$ vs. \bar{D}, \bar{E}	$\bar{6}$ (79.9%) < \bar{D}, \bar{E} (89%)	3.24 (2.3 - 4.56)	P<0.001
\underline{D} vs. \underline{E}	\underline{D} (94.2%) > \underline{E} (89%)	0.5 (0.25 - 0.98)	P=0.03
\bar{D} vs. \bar{E}	\bar{D} (92.3%) > \bar{E} (85.8%)	0.5 (0.29 - 0.88)	P=0.015
\bar{D} vs. \underline{D}	NS		P=0.47
\bar{E} vs. \underline{E}	NS		P=0.26

D - 1st maxillary primary molar E - 2nd maxillary primary molar 6 - 1st maxillary permanent molar
 \bar{D} - 1st mandibular primary molar \bar{E} - 2nd mandibular primary molar $\bar{6}$ - 1st mandibular permanent molar

Results

The effectiveness of LA of 606 maxillary molars and 706 mandibular molars was evaluated. The dental treatments included: 903 restorations, 237 SSCs, 53 pulp treatments, and 119 extractions. The effectiveness of primary LA was 93%, 87%, and 73% in D, E, and 6, respectively [Fig. 5]. The effectiveness was correlated with age (p<0.001), type of tooth (p<0.001), type of treatment (p<0.001), and treated arch (p<0.001). Primary LA failed to anesthetize 13% of molars. Secondary LA by infiltration, IL-CCLAD, greater palatine nerve block (GPNB), posterior superior alveolar nerve block (PSANB), GPNB+PSANB, IANB or intra-pulpar induced effectiveness in 50%, 87%, 64%, 33%, 100%, 67% and 100%, respectively [Fig. 6], and was not correlated to age (p=0.37), type of tooth (p=0.46), type of treatment (p=0.08) or type of primary LA (p=0.42). 2 out of 13 molars which received tertiary LA could not be anesthetized.

Conclusions

The optimal secondary LA technique for maxillary molars includes combination of PSANB and GPNB, and for mandibular molars, IL-CCLAD.

References



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