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Original Article

Comparative Analysis of Two Injection Techniques for Articaine in Symptomatic Irreversible Pulpitis

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Abstract

Background: Pain management is requisite for successful dental treatment. Local anesthetics alone or in combination with other agents are often used during endodontic treatment of irreversible pulpitis. Articaine has been reported to be a superior anesthetic solution for infiltration injection. Several studies have compared the efficacy of articaine and lidocaine following injection in the maxillary molar region. The results of two meta-analyses favored the effectiveness of articaine over lidocaine for infiltration injection**. Aim of the study:** To compare two injection techniques for Articaine in Symptomatic Irreversible Pulpitis. **Material and Methods:** The present study was conducted in the Department of Dentistry. For the study, we selected 40 patients diagnosed with symptomatic irreversible pulpitis in mandibular molars. Patients selected were in good health as determined by oral questioning regarding present and past health history. The patients were randomly grouped into 2 groups, Group 1: Only Inferior alveolar nerve block was given with a conventional dental injector and 27 gauge needle. Group 2: An intraligamentary injection was performed with a special pressure injection syringe and a 27-G needle. Pain was evaluated on the basis of visual analog scale and according to the location of the patient's markup, the pain was classified as follows: 0, no pain; 1–54 mm, mild pain; 55–112 mm, moderate pain; and 114–170 mm, severe pain. **Results:** In the present study, a total of 50 patients with symptomatic irreversible pulpitis were included. The patients were randomly grouped into Group 1 and 2. The number of males in group 1 was 14 and in group 2 was 12. The number of females in group 1 was 11 and in group 2 was 13. It was observed that the success rate of Group 2 patients was significantly higher than Group 1 patients. The results on comparison were found to be statistically significant. **Conclusion:** Within the limitations of the present study, it can be concluded that inferior alveolar nerve block does not provide high success rate for pain free emergency root canal treatment. Intraligamentary injection with 4% articaine has high success rate.

Keywords: Emergency root canal, Articaine, injection technique, IANB

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INTRODUCTION

Pain management is requisite for successful dental treatment. Local anesthetics alone or in combination with other agents are often used during endodontic treatment of irreversible pulpitis. [1, 2] Inflammatory mediators in pulpitis provoke pain responses and inflammation and successful anesthesia is achieved in less than 20% of cases under these circumstances. [3] Articaine has been reported to be a superior anesthetic solution for infiltration injection. Several studies have compared the efficacy of articaine and lidocaine following injection in the maxillary molar region. The results of two meta-analyses favored the effectiveness of articaine over lidocaine for infiltration injection. [4, 5] However, most previous investigations these solutions are crossover studies and only three studies compared them for maxillary first molars with irreversible pulpitis. Administration of IANBs is an unfavourable procedure for many practitioners because the technique requires a well-trained clinician. It is also associated with high failure rate, addition to complications such as muscle trismus, transient hemifacial paralysis, haematoma formation, and needle breakage. [6] Hence, the present study was conducted to compare two injection techniques for Articaine in Symptomatic Irreversible Pulpitis.

MATERIALS AND METHODS

For the study, we selected 40 patients diagnosed with symptomatic irreversible pulpitis in mandibular molars. Patients selected were in good health as determined by oral questioning regarding present and past health history. The patients were randomly grouped into 2 groups, Group 1: Only Inferior alveolar nerve block was given with a conventional dental injector and 27 gauge needle.

After determining the injection site and aspiration, 1.8 mL of solution was injected at a rate of 1 mL/min. Fifteen minutes after the injection, the teeth were isolated and endodontic procedure was started. Group 2: An intraligamentary injection was performed with a special pressure injection syringe and a 27-G needle. The needle was placed between the teeth and the boneat a 30 angle relative to the longitudinal axis of the crown. Then, in the mesial and distal portions of teeth, 0.2 mL of the solution was injected, and after 5 minutes, endodontic treatment was started. Pain was evaluated on the basis of visual analog scale and according to the location of the patient's markup, the pain was classified as follows: 0, no pain; 1–54 mm, mild pain; 55–112 mm, moderate pain; and 114–170 mm, severe pain. Successful anesthesia was presented as painless (0) and mild pain (54 mm) according to VAS criteria.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

RESULTS

In the present study, a total of 50 patients with symptomatic irreversible pulpitis were included. The patients were randomly grouped into Group 1 and 2. The number of males in group 1 was 14 and in group 2 was 12. The number of females in group 1 was 11 and in group 2 was 13. The mean age of the patients in group 1 and 2 was 29.91 years and 32.34 years, respectively. Table 2 shows the success rate of Group 1 and 2. It was observed that the success rate of Group 2 patients was significantly higher than Group 1 patients. The results on comparison were found to be statistically significant. ($p<0.05$) [Fig 1]

Variables	Group 1	Group 2
Number of patients	25	25
Number of males/females	14/11	12/13
Mean age (years)	29.91	32.34

Table 1: Demographics of patients in Group 1 and 2

Success rate	Group 1	Group 2
	41.32 %	68.39 %
p-value	0.02	

Table 2: Success rate of Group 1 and 2

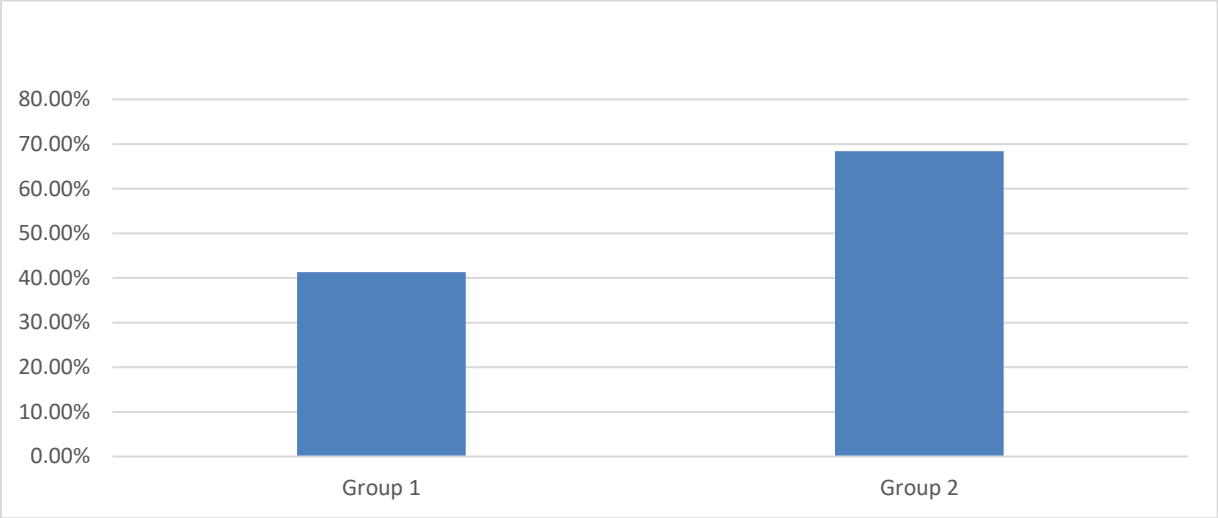

Fig 1: Success rate

DISCUSSION

In the present study, we studied the effect of two injection techniques for Articaine in Symptomatic Irreversible Pulpitis. We studied two techniques, Only Inferior alveolar nerve block and an intraligamentary injection. The study was performed on 40 patients. From the results of our study, this was evident that inferior alveolar nerve

block alone does not provide satisfactory results and has low success rate. On the contrary, intraligamentary injection with Articaine provides higher success rate. The results of our study were statistically significant. The results were compared with previous studies from the literature. Shahi S et al [7] determined the anesthetic efficacy of articaine in mandibular first molars with symptomatic irreversible pulpitis with 3 injection methods: an inferior alveolar nerve block (IANB), an IANB with an intraligamentary injection, and an IANB with buccal infiltration before initiating the endodontic treatment. Ninety-six patients (54 women and 42 men) with a diagnosis of symptomatic irreversible pulpitis in mandibular first molars were selected and randomly assigned into 3 groups (n = 32) according to the injection method as follows: group 1, a conventional IANB injection; group 2, an IANB injection, and after profound lip numbness after the IANB (after 15 minutes), buccal infiltration was administered; and group 3, an IANB injection, and after profound lip numbness after the IANB (after 15 minutes), an intraligamentary injection was performed, and after 20 minutes from the IANB, the endodontic treatment was initiated. The success rate for IANBs with an intraligamentary injection was 75%, and for IANBs with a buccal injection, it was 65.6%. For IANBs alone, the success rate was 28.1%. They concluded that the success rate of IANBs increased with intraligamentary injections and buccal infiltrations with articaine that were performed before initiating treatment. Abazarpoor R et al [8] compared the efficacy of 1.8 mL and 3.6 mL articaine for an inferior alveolar nerve block (IANB) when treating molars with symptomatic irreversible pulpitis. 82 first mandibular molar teeth with symptomatic irreversible pulpitis randomly received conventional IANB injection either with 1 (1.8 mL) or 2 cartridges (3.6 mL) of 4% articaine with 1:100,000 epinephrine. Eighty patients were eligible to participate in this study, which showed that 3.6 mL articaine provided a significantly higher success rate (77.5%) of IANBs compared with 1.8 mL of the same anesthetic solution (27.5%) although neither group had 100% successful anesthesia. They concluded that increasing the volume of articaine provided a significantly higher success rate of IANBs in mandibular first molar teeth with symptomatic irreversible pulpitis, but it did not result in 100% anesthetic success.

Kanaa MD et al [9] compared the efficacy of supplementary repeat inferior alveolar nerve block with 2% lidocaine and epinephrine, buccal infiltration with 4% articaine with epinephrine, intraligamentary injection, or intraosseous injection (both with 2% lidocaine with epinephrine) after failed inferior alveolar nerve block (IANB) for securing pain-free treatment in patients experiencing irreversible pulpitis in mandibular permanent teeth. 182 patients diagnosed with irreversible pulpitis in mandibular teeth were studied. Patients received 2.0 mL of 2% lidocaine with 1:80,000 epinephrine as an IANB injection. Patients who did not experience pain-free treatment received randomly 1 of 4 supplementary techniques, namely repeat lidocaine IANB (rIANB), articaine buccal infiltration (ABI), lidocaine intraligamentary injection (PDL), or lidocaine intraosseous injection (IO). Of the 182 patients, 122 achieved successful pulpal anesthesia within 10 minutes after initial IANB injection; 82 experienced pain-free treatment. ABI and IO allowed more successful (pain-free)

treatment (84% and 68%, respectively) than rIANB or PDL supplementary techniques (32% and 48%, respectively); this was statistically significant. IANB injection alone does not always allow pain-free treatment for mandibular teeth with irreversible pulpitis. Supplementary buccal infiltration with 4% articaine with epinephrine and intraosseous injection with 2% lidocaine with epinephrine are more likely to allow pain-free treatment than intraligamentary and repeat IANB injections with 2% lidocaine with epinephrine for patients experiencing irreversible pulpitis in mandibular permanent teeth. Kung J et al [10] compared efficacy of articaine compared with lidocaine in reducing pain and incidence of adverse events in patients with symptomatic irreversible pulpitis who are undergoing endodontic treatment. Articaine was more likely than lidocaine to achieve successful anesthesia. Maxillary infiltration subgroup analysis showed no significant difference between articaine and lidocaine. For combined mandibular anesthesia studies articaine was superior to lidocaine, with further subgroup analysis showing no difference for mandibular block anesthesia. When used for supplemental infiltration after successful mandibular block anesthesia, articaine was significantly more effective than lidocaine. There were no reports of adverse events. There is a significant advantage to using articaine over lidocaine for supplementary infiltration after mandibular block anesthesia but no advantage when used for mandibular block anesthesia alone or for maxillary infiltration.

CONCLUSION

Within the limitations of the present study, it can be concluded that inferior alveolar nerve block does not provide high success rate for pain free emergency root canal treatment. Intraligamentary injection with 4% articaine has high success rate.

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