

Comparison of anesthetic efficacy of 2% and 4% articaine in inferior alveolar nerve block for tooth extraction – a double-blinded randomised clinical trial

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Objective: Due to the high concentration of 4% for articaine, a certain neurotoxicity potential has been suggested. Therefore, the purpose of this prospective, randomised, double-blind clinical trial was to compare the anesthetic efficacy of 2% articaine and 4% articaine in inferior alveolar nerve block anesthesia for extraction of mandibular teeth.



Figure 1: Radiographs of patients within the study receiving extractions in the posterior lower mandible due to various reasons.

Study design: In **95 patients**, 105 lower molar and premolar teeth were extracted after intraoral inferior alveolar nerve block (Figures 1 & 2). In **53 cases, 2% articaine (group I)** and in **52 cases, 4% articaine (group II)** was administered. **Primary objective** was to analyse the **differences in anesthetic effects** between the two groups (complete/sufficient vs. insufficient/none). **Furthermore**, differences in **pulpal anesthesia** (onset and depth, examined with pulp vitality tester (min)) as well as **length of soft tissue anesthesia** (min) were evaluated. Additionally, the **need for a second injection**, **pain while injecting** (numeric rating scale (NRS)), **pain during treatment** (NRS), **pain after treatment** (NRS), and other possible **complications** (excessive pain, bleeding events, prolonged deafness) were analysed.

Results: Anesthesia was sufficient for dental extractions in both groups without significant differences ($p=0.201$). Onset of anesthesia did not differ significantly ($p=0.297$). A significantly shorter duration of soft tissue anesthesia was seen in **group I (2.9h vs. 4h; $p<0.001$, Figure 3)**. There was no significant difference in the need for a second injection ($p=0.359$), injection pain ($p=0.386$), and pain during ($p=0.287$) or after treatment ($p=0.412$, Figure 4). In both groups, no complications were seen.

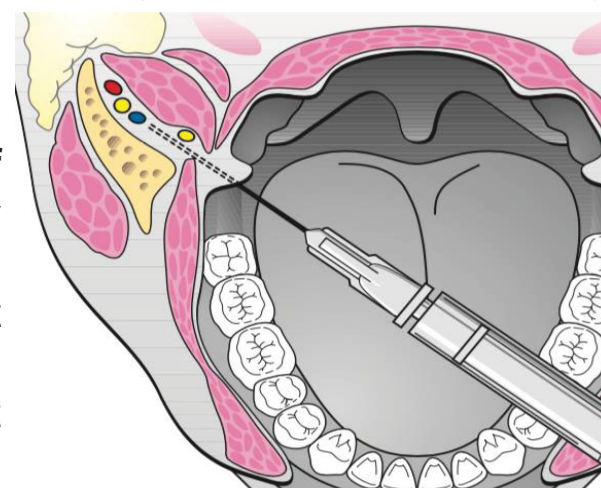


Figure 2: In all cases, intraoral inferior alveolar nerve blocks were administered.

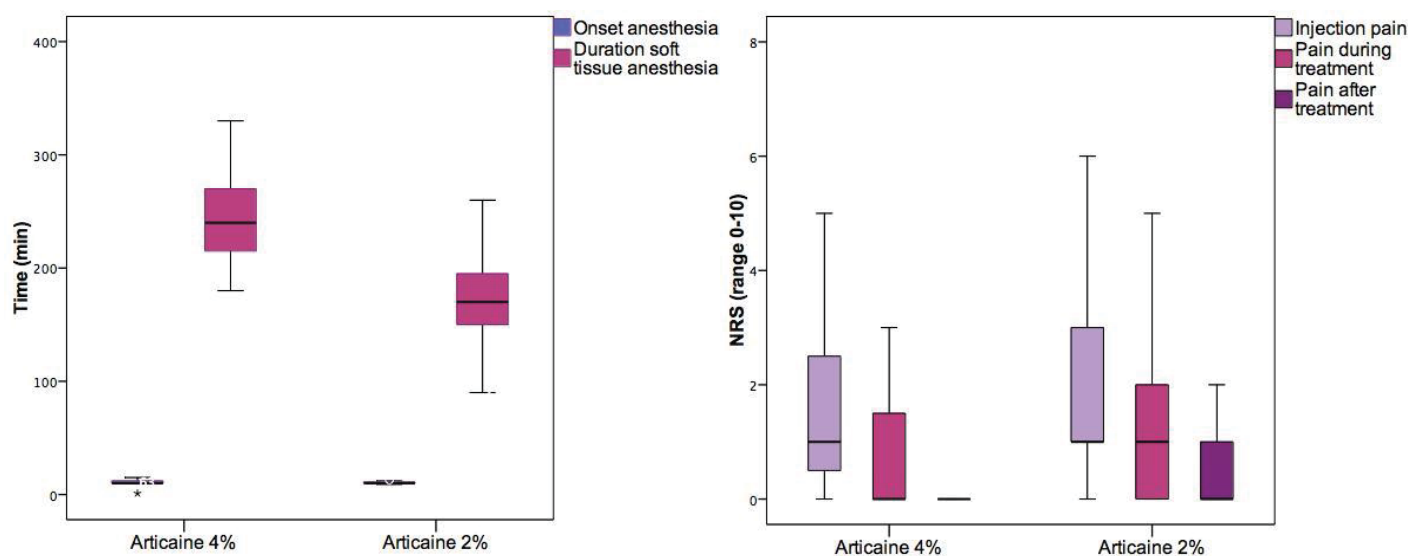


Figure 3 (left): Boxplots showing non-significant differences in onset ($p=0.297$) and significant differences in soft tissue duration ($p<0.001$).

Figure 4 (right): Boxplots showing non-significant differences in injection pain ($p=0.386$), pain during treatment ($p=0.287$) as well as in pain after treatment ($p=0.412$).

Conclusion: Even for pain after treatment, the local anesthetic effect of the **4% articaine** solution is **not significantly better** when compared to 2% articaine. For mandibular tooth extraction, articaine 2% may be used as an alternative as well.

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