



## PAIN ASSOCIATED WITH INTRAOSSEOUS ANESTHESIA WITH QUICKSLEEPER AND POST-OPERATIVE CONDITION OF THE PERFORATION SITE

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### SUMMARY

**Purpose:** The aim of the study is to determine the pain during intraosseous anesthesia (IA) with the Quicksleeper and the post-operative state of the perforation site.

**Materials and methods:** The subjects of the study were 58 patients who underwent successful intraosseous analgesia, indicated with treatment of caries or irreversible pulpitis of mandibular first and second molars. The Visual Analogue Scale was used to assess the pain during the perforation of the compact bone and during the infiltration of anesthetic solution into the cancellous bone. All 58 patients were followed up at the 24th hour and on the 7th day after the manipulation, and the following parameters were evaluated: condition of the perforation site and presence of palpation pain.

**Results:** Only 10 patients registered mild pain during perforation of compact bone and 8 – during anaesthetic infiltration. At 24 hours after IA, 12 patients registered mild pain, 6 patients registered moderate pain at the perforation site. On the 7th day, we established mild pain in 4 patients. After IA a reactive inflammatory process was registered in 27% of the cases at 24 hours, while on the 7th day, the inflammatory reaction was registered in only 6% of the cases.

**Conclusion:** The intraosseous system Quicksleeper allows painless perforation of the compact bone and infiltration of the anesthetic solution into the cancellous bone due without risk of serious post-operative complications at the site of anesthesia.

**Keywords:** intraosseous anesthesia, Quicksleeper, Visual Analogue Scale,

### INTRODUCTION

Intraosseous anesthesia (IA) involves intraosseous injection, whereby local anaesthetic is injected into the cancellous bone [1]. The computer-assisted intraosseous system Quicksleeper exhibits some advantages, including less painful anesthesia, short onset, smaller doses, reduced soft tissue numbness, and the provision of palatal or lingual, as well as buccal, anesthesia with single needle penetration [1-3].

Pain during the performance of IA, as well as post-operative pain at the perforation site, are often described as disadvantages of this analgesia technique [4, 5]. The reasons for this are temperature changes accompanying the process of perforating the compact bone, traumatic tissue damage, the infiltration speed of the anaesthetic solution into the cancellous bone, and the subsequent increase in intraosseous pressure.

The aim of the study is to determine the pain during IA with the Quicksleeper (Dental Hi Tec, Cholet Cedex, France) and the post-operative state of the perforation site.

### MATERIALS AND METHODS

This clinical study was conducted with a total of 58 patients who underwent successful intraosseous analgesia, indicating the treatment of caries or irreversible pulpitis of mandibular first and second molars. The study was approved by the Ethical Committee of the Medical University of Plovdiv (No. 6/10.11.2016). Written informed consent was obtained from every patient.

IA was performed with computer assisted system Quicksleeper in the following steps:

- infiltrative anesthesia of soft tissue – 0,3 mL anesthetic was infiltrated at a 15° angle in the perforation point (fig. 1);

**Fig. 1.** Infiltrative anesthesia



- perforation of compact bone - target point is 2 mm apical from the intersection of the horizontal (line passing through margo gingivalis) and vertical line (line dividing interdental septum) (fig. 2);

**Fig. 2.** Intraosseous anesthesia



The Visual Analogue Scale (VAS) was used to assess the pain during the execution of IA, which was completed by each patient after the anesthesia. The intensity of the pain was reported both during the perforation of the compact bone and during the infiltration of anesthetic solution into the cancellous bone.

All 58 patients participating in the clinical study were followed up at the 24th hour and on the 7th day after the manipulation. The following parameters were evaluated:

- \* Condition of the perforation site and soft tissues around it. The presence of a reactive inflammatory process was examined by inspection and palpation at the site of the perforation. Color, swelling and exudation of the soft tissues around the perforation site are examined;

- \* Presence of palpation pain in the area of the perforation was recorded using the VAS scale.

Statistical analysis was performed by Statistica 4.5 (StatSoft, Inc. Microsoft, USA), SPSS 11.5 (Inc, Chicago, IL, USA), Excel 7.0 VB for applications and PraphPad Prism 3.0 (PraphPad, Soft, USA). Data was processed with detailed and comparative statistical analysis.

**RESULTS**

In 82,7% of the cases, perforation of compact bone is not accompanied by pain, while in 17,3% of the cases, there was mild pain. 8 patients registered mild pain during anaesthetic infiltration (Table 1).

**Table 1.** Assessment of pain during intraosseous anesthesia.

<b>Pain during intraosseous anesthesia</b>	<b>n</b>	<b>No pain n%</b>	<b>Mild pain n%</b>	<b>Moderate pain n%</b>	<b>Severe pain n%</b>
Perforation pain	58	48 patients (82,7%)	10 patients (17,3%)	No registrate	No registrate
Infiltration pain	58	50 patients (86,2%)	8 patients (13,8%)	No registrate	No registrate

At 24 hours after IA, 12 patients registered mild pain, 6 patients registered moderate pain at the perforation site. On the 7th day, we established mild pain in 4 patients (Table 2).

**Table 2.** Pain during palpation in the perforation site at 24 hours and 7th day after IA.

<b>Clinical examination</b>	<b>n</b>	<b>No pain n%</b>	<b>Mild pain n%</b>	<b>Moderate pain n%</b>	<b>Severe pain n%</b>
24 hours	58	40 patients (69%)	12 patients (20,7%)	6 patients (10,3%)	No registrate
7 <sup>th</sup> day	58	53 patients (91,4%)	4 patients (8,6%)	No registrate	No registrate

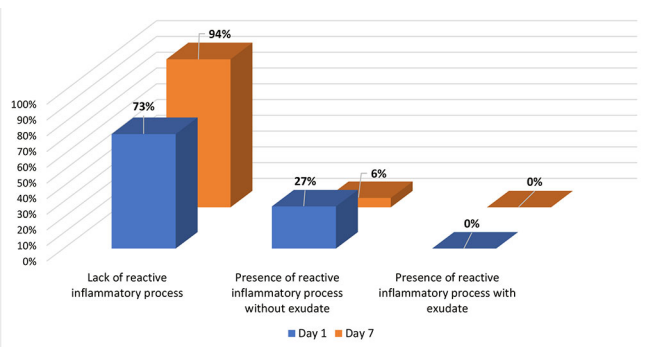
**Fig. 3.** Perforation site with no data of soft tissue inflammation immediately after IA (a), at 24 hours (b) and 7th day (c)



**Fig. 4.** Perforation site with soft tissue inflammation immediately after IA (a), at 24 hours (b) and 7th day (c)



**Fig. 5.** Condition of the perforation site at 24 hours and 7th day after IA



After IA, a reactive inflammatory process was registered in 27% of the cases at 24 hours, while on the 7th day an inflammatory reaction was registered in only 6% of the cases. No patients with exudate were registered (Fig. 3, 4, 5).

## DISCUSSION

The technique of IA was introduced in dentistry over four decades ago. The armamentarium has evolved from using a round bur, endodontic reamer, buetelrock drill to slow-speed 27-gauge perforator drills with guide sleeves [6]. Nowadays, there is a wide variety of devices for IA, such as Stabident (Fairfax Dental Inc., Miami, FL), the X-tip system (Dentsply, York, PA), Anesto (W&H, DentalWerk Bürmoos, Austria) and computer assisted system Quicksleeper (Dental Hi Tec, Cholet Cedex, France),

which allow using this technique as primary anesthesia, especially of the mandibular molars.

In 2021, Simeonova et al. summarizes the literature data regarding pain during and after intraosseous anesthesia [7]. In the present study, 17.3% of patients reported mild pain when perforating the compact bone, and none reported moderate to severe pain. Slight pain during anesthetic infiltration into the spongiosa was recorded by 8 patients (Table 1).

Reisman et al. found a 9% incidence, Nusstein et al. a 0% incidence, Bigby et al. a 16% incidence of moderate-to-severe perforation pain, using the Stabident system [4, 8, 9]. The solution deposition pain has been reported by Nusstein et al. as 5% using 1.8 ml of 2% lidocaine with 1:100,000 epinephrine, while Reisman et al. (2) reported a 31% incidence of moderate-to-severe deposition pain using 3% mepivacaine [8, 9]. Reisman et al. (1997) reported, in 2 to 15% of cases, post-operative pain at the perforation site, which resolved in a short time, and in 4 to 5% - swelling, bruising or suppuration within two weeks [8]. At the 24th hour, 20,7% of patients registered mild pain and 10,3% - moderately severe pain on palpation in the area of the perforation site.

The presence of a reactive inflammatory process (redness and slight tissue swelling) at the site of anesthesia was observed in 27% of patients. Exudation from the perforation hole was not detected in any case. After one week, the number of patients with pain on palpation (8,6% with mild pain) and reactive inflammation around the perforation site (6%) was significantly reduced.

## CONCLUSION

The intraosseous system Quicksleeper allows painless perforation of the compact bone and infiltration of the anesthetic solution into the cancellous bone due to electronic rotation of the needle and dosage of the anesthetic solution, without risk of serious post-operative complications at the site of anesthesia.

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## REFERENCES:

1. Han K, Kim J. Intraosseous anesthesia using a computer-controlled system during non-surgical periodontal therapy (root planing): Two case reports. *J Dent Anesth Pain Med*. 2018 Feb;18(1):65-69. [PubMed]
2. Angelo Z, Polyvios C. Alternative practices of achieving anaesthesia for dental procedures: a review. *J Dent Anesth Pain Med*. 2018 Apr; 18(2):79-88. [Crossref]
3. Özer S, Yaltirik M, Kirli I, Yargic I. A comparative evaluation of pain and anxiety levels in 2 different anesthesia techniques: locoregional anesthesia using conventional syringe versus intraosseous anesthesia using a computer-controlled system (Quicksleeper). *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2012 Nov;114(5 Suppl): S132-9. [PubMed]
4. Bigby J, Reader A, Nusstein J, Beck M, Weaver J. Articaine for Supplemental Intraosseous Anesthesia in Patients with Irreversible Pulpitis. *J Endod*. 2006 Nov;32(11):1044-7. [PubMed]
5. Moore PA, Cuddy MA, Cooke MR, Sokolowski CJ. Periodontal ligament and intraosseous anesthetic injection techniques. Alternatives to mandibular nerve blocks. *J Am Dent Assoc*. 2011 Sep;142(Suppl 3):13S-8S. [PubMed]
6. Jain SD, Carrico CK, Bermanis I, Rehil S. Intraosseous Anesthesia using Dynamic Navigation Technology. *J Endod*. 2020 Dec; 46(12):1894-1900. [PubMed]
7. Simeonova E, Aleksandrova V, Aleksandrov S. Intraosseous anesthesia of the mandibular molars: A critical literature review. *J Int Dent Med Res*. 2021 Dec;14(4):1604–1610. [Internet]
8. Reisman D, Reader A, Nist R, Beck M, Weaver J. Anesthetic efficacy of the supplemental intraosseous injection of 3% mepivacaine in irreversible pulpitis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1997 Dec;84(6): 676-82. [PubMed]
9. Nusstein J, Reader A, Nist R, Beck M, Meyers WJ. Anesthetic efficacy of the supplemental intraosseous injection of 2% lidocaine with 1:100,000 epinephrine in irreversible pulpitis. *J Endod*. 1998 Jul;24(7):487-91. [PubMed]

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