

# THE EFFICACY OF SUPPLEMENTAL INTRAOSSEOUS ANESTHESIA AFTER INSUFFICIENT MANDIBULAR BLOCK

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## ABSTRACT

It is a well-known scientific fact that only a small percentage of infiltration of inferior alveolar nerve is clinically proven to be efficient. The objective of this study was to determine the anesthetic efficacy of supplemental intraosseous injection, used after the insufficient classical mandibular block that didn't provide deep pulp anesthesia of mandibular molar planned for extraction. The experimental teeth consisted of 98 mandibular molars with clinical indication for extraction. Based on the history of disease, we indicated the extraction of the tooth. After that each tooth was tested with a electric pulp tester P1. We tested the pulp vitality and precisely determined the level of vitality. After that, each patient received classical mandibular block, and the pulp vitality was tested again. If the pulp tester indicated negative vitality for the certain mandibular molar, and the patient didn't complain about pain or discomfort during the extraction, the molar was extracted and the result was added to anesthetic success rate for the classical mandibular block. If, five minutes after receiving the mandibular block, the pulp tester indicated positive vitality (parameters of vitality) or the patient complained about pain or discomfort (parameters of pain and discomfort), we used the Stabident® intraosseous anesthesia system. Three minutes after the application of supplemental intraosseous injection the molar was tested with the pulp tester again. The anesthetic solution used in both anesthetic techniques is lidocaine with 1:100.000 epinephrine. The results of this study indicate that the anesthetic efficacy of the mandibular block is 74.5%, and that supplemental intraosseous anesthesia, applied after the insufficient mandibular block, provides pulpal anesthesia in 94.9% of mandibular molars. The difference between anesthetic efficacy of the classical mandibular block and anesthetic efficacy of the supplemental intraosseous anesthesia, applied after the insufficient mandibular block, is obvious.

**KEY WORDS:** intraosseous, anesthesia, supplemental

## INTRODUCTION

Retrospective analysis shows that need for supplement to inefficiency of mandibular block was noticed 1968, when Magnes and co-workers(1) published their first study, which at the same time promoted intraosseous anesthesia. Technique described in this study was very popular during early seventies. The first study, which elaborated scientifically in overwhelming manner all properties of system of intraosseous anesthesia was published by Leonard (2) this study brought data of workability of this method and described proper technique of application of Stabident system. Coggins and co-workers(3) published 1996 efficiency of supplemental intraosseous anesthesia in maxillary and mandibular molars and announced to the scientific public success of supplemental intraosseous anesthesia, by measuring vitality of the first lower molars and brought results of success of 93%. In December 1997 Reisman and Reader(4) investigated effects of supplemental intraosseous anesthesia in vital tooth, which require endodontic treatment. They have published that 75% of patients requested additional anesthesia after mandibular block because of subjective feeling of pain in attempt of endodontic treatment. The first intraosseous anesthesia showed success of 82% and the second was successful in 98% cases. In January 2000 Gallatin and co-workers,(5) published the study, which apart from efficiency of intraosseous anesthesia, cleared up impact of intraosseous anesthesia on heartbeat, what was for the certain period of time subject of scientific discussions. Analyzing relevant studies related to intraosseous local anesthesia, which was published recently, it is concluded that there is not published study, which would bring results on efficiency of additional intraosseous anesthesia when extracting of vital teeth with clinical indication for extraction.

## MATERIAL AND METHODS

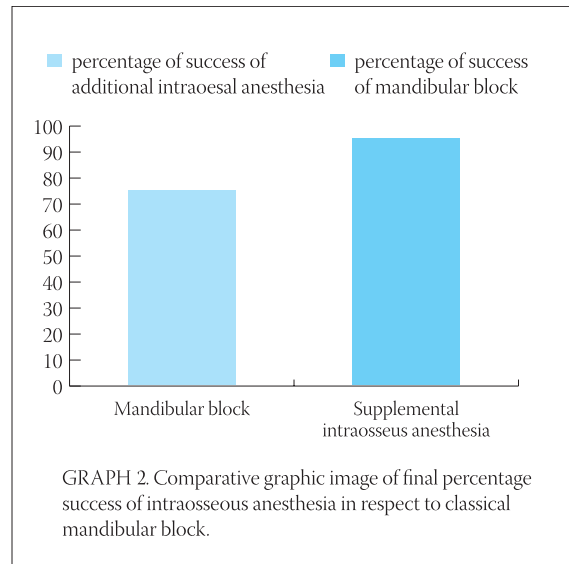
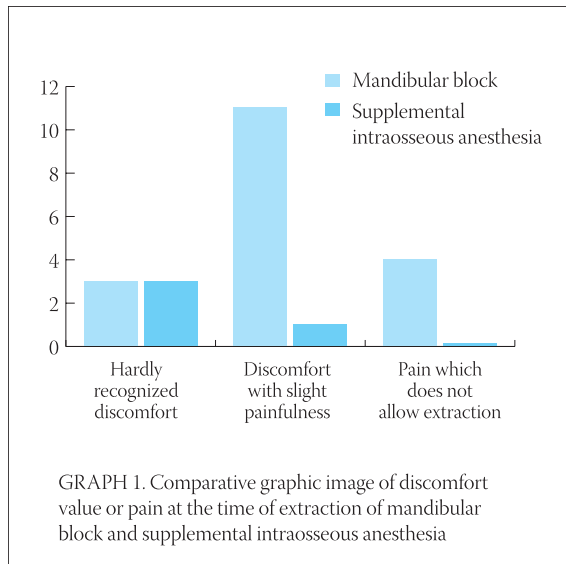
Teeth sample are 98 mandibular molars, which show signs of vitality and clinical indication for extraction was established. Operative procedure was done with respect to ethical standards regulated by Helsinki Declaration. After history procedure and establishment of indication for extraction, standard apparatuses for testing of tooth pulp P1 (Jugodent) is to be tested vitality of tooth in subject, and precisely determined level of vitality on the scale 1 to 10. The first to patient is to be applied classical mandibular block. Five minutes after application of mandibular block again is to be tested vitality of tooth pulp in the same way and subjective feeling of numbness of

lower lip and tongue. Patients to whom apparatus for vitality shows that tooth in subject is entirely under anesthesia (0 on the vitality scale), and do not complain about discomfort or pain at the time of work, are to be treated by extraction of tooth in the standard manner, their results are registered into the research chart in order to enter into final percentage relation on success of mandibular block. Patients whose tooth show signs of vitality on apparatus for measure of vitality of tooth pulp (1 to 10 on the vitality scale) 5 minutes after application of mandibular block or if they complain about discomfort and pain at the time of extraction attempt, what would understand absence of full affect of conventional block, to them are applied intraosseous Stabident anesthesia, following the rules of application recommended by manufacturer, as described above. Three minutes after application of intraosseous anesthesia the following parameters are followed up and registered in the research chart:

1. Vitality test graded on the scale from 1 to 10
2. Subjective feeling of discomfort at the time of extraction graded from 0 to 3.

## RESULTS

After application of conventional mandibular block, out of total number of mandibular block under anesthesia – 98 teeth, 73 of them have positive signs of numbness of lower lip and tongue of the side in subject, negative vitality test and show absolute absence of pain during the work. Out of this come out that percentage of success of classical mandibular block is 74.5%. Tooth extraction was not made in those cases where vitality signs are positive in order to avoid pain and discomfort in patients at the time of extraction. Number of mandibular molars with negative test of vitality and show absence of pain during the work (73 molars) is statistically significantly higher than number of teeth which show either positive test of vitality or some pain and discomfort at the time of attempt of extraction (25 molars). Value  $\chi^2$  of test is  $\chi^2 = 23.515$ ; d.f.= 1, and level of significance  $p < 0.0001$ . Total number of mandibular molars, which 5 minutes after application of classical mandibular block show either positive vitality test (1 to 10 on the vitality scale) or some pain and discomfort at the time of extraction attempt (1 to 3 on discomfort scale) is 25 teeth. Out of total number of mandibular molars under anesthesia 5 minutes after application of classical mandibular block, seven of them show vitality signs (1 to 10 on the vital-



ity scale) and eighteen mandibular molars show apart from negative test of vitality. Out of total twenty five molars, which showed either positive vitality test or some painfulness and discomfort at the time of extraction attempt, statistically significant were less molars (7) which show vitality signs than number of molars, which show apart from negative vitality test painfulness at the time of extraction attempt (eighteen molars). Value  $\chi^2$  test is  $\chi^2 = 4.84$ , d.f.=1, and level of significance  $p < 0.005$ . Out of total 18 molars with negative vitality test, significantly the highest number of molars (11 molars) were with discomfort and slight pain (2 on discomfort scale) in respect to number of molars (3 molars) with hardly recognized discomfort (1 on discomfort scale) and number of molars (4 molars) with extremely strong pain at the time of extraction attempt (3 on discomfort scale). Value of  $\chi^2$  test is  $\chi^2 = 6.33$ ; d.f.=2, level of significance  $p < 0.005$ . Out of seven tested teeth three minutes after application of intraosseous anesthesia 1 mandibular molar show vitality sign (1 to 10 on the vitality scale). Out of total number of teeth which 3 minutes after application of intraosseous anesthesia fail to show vitality signs by apparatus for testing of vitality of teeth pulp (0 on the vitality scale) 6 molars, none show any painfulness or discomfort at the time of extraction (0 on discomfort scale). Patients to whom apparatus for vitality of teeth pulp 5 minutes after application of classical mandibular block show negative test of vitality (0 on vitality scale) and they felt discomfort or pain at the time of extraction attempt (1 to 3 on discomfort scale) intraosseous anesthesia was applied too. Total number of such mandibular molars is 18 teeth. Out of eighteen mandibular molars 3 minutes after application of intraosseous anesthesia 14 fail to show any discomfort or pain at the time of extraction attempt (0 on discomfort scale).

Remaining 4 teeth show some discomfort as follows:

- 3 mandibular molars with hardly recognized discomfort (1 on discomfort scale)
- 1 mandibular molar with discomfort and slight pain (2 on discomfort scale)
- None mandibular molar with pain which does not allow extraction (3 on discomfort scale)

Difference in number of teeth which show negative vitality test (5 molars) after application of intraosseous anesthesia in respect of number of teeth which show positive signs of vitality (1 molar) is differ significantly on the lower level of significance. Value of  $\chi^2$  test is  $\chi^2 = 3.57$  and level of significance is  $p < 0.10$ . Sum of all stated statistic data brings and percentage of success of intraosseous anesthesia which we supplement to insufficient mandibular block in our research. As result we get total percentage of success of supplemental intraosseous anesthesia of 94.9%.

## DISCUSSION

Scientific interest for percent of success of mandibular block presented during last decades, when were published number of studies dealing with those issues. Kaufman and co-workers(6), (1987) Reisman and co-workers (4) published scientific studies where was used apparatus for testing of vitality of tooth pulp as the basic parameter of proving of efficiency of mandibular block. The first study which brings results on efficiency of additional intraosseous anesthesia published Leonard (5) In clinical study author published success of intraosseous anesthesia of 88%. Coginns and co-workers(3) published efficiency of primary intraosseous anesthesia in mandibu-

lar molars and published percentage of success of 93%. The same year Dunbar et al(7). published success of additional intraosseal anesthesia by measuring of vitality of the first lower molars and brought results on success of 98%. Reisman and co-workers.(4) researched efficiency of additional intraosseal anesthesia in vital teeth which require endodontic treatment. They published extremely low percentage of success of conventional block with data that 75% of teeth after classical block required additional anesthesia because of subjective feeling of pain at the time of attempt of entering of endodont instrument into root channel of vital tooth. Quoted publications represent scientific base for further research. Taking sample of 98 mandibular molars we got percentage success of classical mandibular block of 74%. Percentage of success responding to up to now studies, which light up problem of effect of mandibular block. Out of total number of teeth 25 require additional intraosseal anesthesia. From this group of teeth, which show insufficient effect of classical mandibular block 7 show positive vitality signs and after application of intraosseal anesthesia positive vitality sign is registered on one sample only. Difference in number of teeth which show negative vitality test of tooth pulp after application of additional intraosseal anesthesia (6 molars) in respect to those which show vitality signs (1 molar) differs significantly on lower level of significance  $p < 0,10$ . Further more out of total sample of mandibular molars 18 have signs of painfulness or discomfort at the time of extraction attempt after classical mandibular block. It is specially significant data that out of total number of those teeth 11 have discomfort and pain feeling (2 on discomfort scale) which is statistically significant in respect of number of teeth with

1 and 3 level of discomfort with level of significance of  $p < 0,005$ . On the other side discomfort after application of additional intraosseal anesthesia was registered in four samples only: 1 and 2 on the discomfort scale, but none sample had pain which does not allow extraction (3 on the discomfort scale). As result we got total percentage of success of additional intraosseal anesthesia, which we applied on insufficient classical mandibular block, which is in our research 94.9%. Out of all stated is notable that results of our research are in immediate relation with results of already published studies, which treat the same issues, but using different methodology principles, what prove the hypothesis set for such researches.

## CONCLUSION

- Conductive anesthesia on alveolaris inferior is clinically successful in some percentage only, what is the conclusion of achieved percentage of success of 74.5%. Achieved percentage of success is in close relation with up to now published researches.
- Additional intraosseous anesthesia as supplement to insufficient mandibular block shows success of 94.9%, which is in any case in close relation with achieved results of up to now researches with different methodology approach to this scientific problem.
- Positive signs of numbness of lower lip and tongue after application of classical mandibular block does not always mean and clinically successful anesthesia, which would show negative vitality and painless work on mandibular molars with clinical indication for extraction.

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