Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology

journal homepage: www.elsevier.com/locate/jomsmp

Original research

Comparing the anterior middle superior alveolar nerve block and infraorbital nerve block for maxillary anterior teeth anesthesia: A randomized clinical trial

Anjani Kumar Yadav[a,*], Arpita Singh[b], Leeza Pradhan[c], Mehul R. Jaisani[a], Ashok Dongol[a], Pradeep Acharya[a], Alok Sagtani[d]

[a] Department of Oral and Maxillofacial Surgery, B. P. Koirala Institute of Health Sciences, Dharan, Nepal
[b] B&C Medical College Teaching Hospital and Research Center, Pvt. Ltd., Birtamod, Jhapa, Nepal
[c] Kathmandu Model Hospital, Kathmandu, Nepal
[d] Patan Academy of Health Sciences, Kathmandu, Nepal

ARTICLE INFO

Keywords:
Anesthetic-success
Infra-orbital
AMSA

ABSTRACT

Objective: To compare the efficacy of the Anterior Middle Superior Alveolar nerve block with that of the Infra-orbital nerve block in achieving anesthesia in the anterior maxillary teeth.
Study design: We recruited 62 patients who underwent vital tooth/teeth extraction under local anesthesia. We divided the patients into two groups: group A received Anterior Middle Superior Alveolar (AMSA) nerve block and group I received Infra-orbital nerve block (IONB). We assessed the Pulpal anesthesia by Pulp Tester with 0–10 digital reading, soft tissue anesthesia by pricking with periosteal elevator and injection pain using10 cm VAS (Visual Analogue Scale) score. We entered collected data in Microsoft excel 2010 and categorical variables analysed using Chi Square test and non-categorical variables analysed using Independent t (parametric) and Mann Whitney U (non-parametric) tests.
Results: We achieved significantly higher pulpal anesthesia with infra-orbital nerve block for canine ($p = .04$) and 1st premolar ($p = .02$) as compared to anterior middle superior alveolar nerve block; but no significant difference was found in pulpal anesthesia for 2nd premolar, central and lateral incisors. The labial gingival anesthesia was significantly higher with infra-orbital nerve block than with anterior middle superior alveolar nerve block ($p < 0.001$). The VAS score in group I was 5.2 ± 2.1 (mean ± SD) and that in group A was 3.9 ± 1.3 (mean ± SD) which was statistically significant ($p = .004$).
Conclusion: Anterior middle superior alveolar nerve block resulted in inadequate pulpal and soft tissue anesthesia but less injection pain. Infra-orbital nerve block produced higher pulpal anesthesia for 1st premolar and canine but more injection pain.

1. Introduction

Administration of local anesthetic solution is one of the most important and frequently performed steps in routine dental procedures like restorative, periodontal and oral surgical procedures. Temporary anesthesia is a prerequisite to ensure painless treatment and is therefore important for the success of various dental therapeutic procedures. A comfortable and consistent local anesthesia can increase the level of trust between the patients and the operators, as the thought of an intraoral injection causes considerable anxiety in many patients [1]. To perform extraction in maxillary anterior region, pulpal along with both, buccal (labial) and palatal soft tissues anesthesia is required, but infra-orbital nerve block (IONB) causes pulpal anesthesia and only buccal (labial) soft tissue anesthesia, thus necessitating additional palatal injection (either greater palatine, or nasopalatine, or both) for anesthesia of palatal soft tissue. To overcome the side effects of labial numbness as well as high dose of local anesthetic because of multiple injections associated with IONB thereby reducing the total amount of delivered vasoconstrictor that may prove useful for cardiovascular compromised patients, "Friedman and Hochman [2–4] developed a new technique, i.e. AMSA (anterior middle superior alveolar) nerve block in 1997 with the development of CCLAD (Computer Controlled Local Anesthetic Delivery) system". The AMSA injection site is located palatally at a point that bisects the premolars and is approximately halfway between

* Corresponding author at: Department of Oral and Maxillofacial surgery, College of Dental Surgery, B.P. Koirala Institute of Health Sciences, Ghopa Camp, Dharan- 18, Sunsari, Nepal.
E-mail address: anjanikumar.yadav@bpkihs.edu (A.K. Yadav).

https://doi.org/10.1016/j.ajoms.2018.02.005
Received 22 August 2017; Received in revised form 8 February 2018; Accepted 14 February 2018

the midpalatine raphe and the crest of the free gingival margin [3–5]. The middle superior alveolar (MSA) nerve and anterior superior alveolar (ASA) nerve branch from the infraorbital nerve before they exit from the infra-orbital foramen. The plexus where the two nerves join is the target site for the AMSA injection [3–5]. Deposition of sufficient volume of local anesthetic allows it to diffuse through nutrient canals and the porous cortical bone to envelop the nerve plexus at this site. Therefore, this technique induces anesthesia from the incisor to the premolar; associated labial and palatal gingiva, and periodontium; and possibly to the mesiobuccal root of the first molar from a single injection site. Because the local anesthesia is deposited on the palate, the muscles of facial expression and upper lip are not anesthetized.

Although studies have been done to evaluate the efficacy of AMSA nerve block in restorative procedures and periodontal surgery, to the best of our knowledge, no study has been reported comparing AMSA nerve block and IONB in patients undergoing extraction of maxillary anterior teeth. The aim of this prospective, randomized, double blinded clinical study on humans was to evaluate the anesthetic efficacy of AMSA (single injection) nerve block as compared to IONB (in which additional palatal injections are required) to perform extraction in maxillary anterior region. Computer-controlled anesthetic delivery system has been recommended with AMSA nerve block to achieve consistent anesthetic delivery to achieve maximum anesthetic success, although not an absolute requirement [5]. We used conventional syringe due to unavailability of the CCLAD system in our set up. We assessed pulpal anesthesia by electronic pulp testing and applied a standard definition of anesthetic success: two consecutive episodes of no response to pulpal stimulation at the maximum setting [6].

2. Materials and methods

We designed a prospective, randomized, double blinded clinical study on humans. In this study, we included the patients undergoing vital tooth/teeth extraction under local anesthesia and giving informed consent to participate in the study. Patients with the history of orofacial anesthesia or paresthesia, history of allergy to local anesthetic solution, and infection at the site of injection were excluded from this study. Based on the study- A Comparision of the Anterior Middle Superior Alveolar Nerve Block and Infra-orbital Nerve Block for Anesthesia of Maxillary Anterior Teeth [6], the lowest percentage of pulpal anesthetic success with AMSA nerve block was 42 and that with IONB was 11 in central incisor. Considering 95% confidence and 80% power and using formula for two independent sample proportion (Z test), the total sample size became 62. Patients were randomized into two groups; each comprising 31 patients. Group A patients received anterior middle superior alveolar (AMSA) nerve block and group I patients received infra-orbital nerve block (IONB). Randomization was done with the computer generated codes maintained in a sequentially numbered envelope and the local anesthetic injections were given accordingly. The local anesthetic regimens were as follows:

– Autoclavable self-aspirating syringe with sterile 27 guage 0.40 × 35 mm needle was used (Fig. 1).

Fig. 1. Autoclavable syringe and 27 G needle used for administration of local anesthesia.

Fig. 2. Demonstration of technique of anterior middle superior alveolar (AMSA) nerve block.

– 1.0 ml of 2% lignocaine with 1:80,000 epinephrine was administered in both AMSA nerve block and IONB techniques.

2.1. Technique for AMSA nerve block

Needle was inserted on the hard palate at a point that bisects the maxillary first and second premolars, midway between the crest of the gingival margin and the mid-palatine suture (Fig. 2). The needle was advanced 1–2 mm every 4–6 s while administering the solution at slow rate. After initial blanching was observed (approximately after 30 s), pause was given for several seconds to allow for onset of superficial anesthesia. The rate of anesthetic delivery was 0.5 ml/minute. A waiting period of 10 s was given before slowly removing the needle to avoid dripping of solution from the punctured site.

2.2. Technique for IONB

Needle was inserted at the height of the mucobuccal fold directly over first premolar and the target area was infra-orbital foramen (Fig. 3).The general depth of needle penetration was 16 mm for adult of average height. The rate of anesthetic delivery was 0.5 ml/minute. Firm pressure was maintained over the injection site both during and for at least 1 min after the injection to increase diffusion of local anesthetic into the infra-orbital foramen. Suitable palatal injections (greater palatine or nasopalatine or both) as indicated were given to all the patients in IONB group to perform extraction.

Baseline pulp sensitivity of the teeth that were extracted as well as the other teeth present in the same quadrant (from second premolar to central incisor) was assessed before injecting the anesthetic. Then a single operator (consultant) performed the nerve block for all the patients using above mentioned technique. The observer, who was masked to the type of injection administered, used an electronic pulp tester (*PARKEL PULP VITALITY TESTER, MODEL D624, PARKEL, INC., EDGEWOOD, NEW YORK 11717*) to assess the patients' pulpal responses of all the vital teeth present in the quadrant. Considering the time of onset of anesthesia 2–5 min, electronic pulp testing was started two minutes after the injection till two consecutive episodes of no response at maximum stimulation (i.e. 10) were achieved. Electronic pulp testing was continued to the maximum of eleven minutes (the maximum median time of onset of anesthesia in the study by Corbett et al.