

Efficacy of Anaesthesia Techniques in Periapical Diseased Tooth

SAMAN MALIK¹, FAIQA HASSAN², MUHAMMAD FAROOQ³, USMAN UL HAQ⁴, SAQIB GHAFOR KAYANI⁵

¹Assistant Professor, Oral Biology, HITEC-IMS Dental College, Taxila Cantt.

²Assistant Professor, Oral Medicine, HITEC-IMS Dental College, Taxila Cantt.

³Assistant Professor Oral Medicine, Avicenna Dental College Lahore

⁴Assistant Professor, Oral and Maxillofacial Surgery Wah Medical College, Wah Cantt.

⁵Assistant Professor/HOD Oral Medicine, Watim Medical & Dental College Rawalpindi

Correspondence to Dr. Saman Malik, Email: Somey_hassan@hotmail.com, Tel. 0312-3456303

ABSTRACT

Almost all minor oral surgical procedures can be performed effectively if patient is relaxed and comfortable. One of the contributing factor for patient comfort is effective pain control. This can be achieved pre and per-operatively by various local anaesthetic techniques. Infiltration techniques are commonly employed in all maxillary and mandibular teeth whereas mandibular posterior teeth requires a nerve block. In certain cases, these techniques fails or provide inadequate anaesthesia, for example, teeth associated with periapical pathology. Therefore, we conducted a study to determine effectiveness of infiltration and block techniques as well as when supplemented by intra-ligament injection for anaesthesia in periapical infected teeth.

Keywords: anaesthesia, infiltration technique, block technique, intraligament technique, periapical pathology.

INTRODUCTION

It is always an important part of medicine and dentistry to control pain and discomfort^{1,2}. Successful dental practice depends on pain free procedures³. So achieving local anaesthesia is very important in clinical dental practice^{1,2}. Many basic techniques are used for dental anaesthesia such as topical anaesthesia, infiltration and nerve block⁴.

For infiltration anaesthesia technique only terminal nerve endings are anesthetized, as local anaesthetic solutions is deposited close to nerve supplying teeth and periodontal tissues⁵. Thus only the injected zone is anesthetized and it does not extend beyond the zone of diffusion of drug. This technique is very effective in anesthetizing maxillary teeth as the cortical bone on buccal aspect of maxillary teeth is thin and it allows diffusion of anaesthetic solution through it very well^{6,7}.

The inferior alveolar nerve block technique involves depositing local anaesthesia near the main trunk of mandibular nerve as it exits mandibular foramen and divides into inferior alveolar and lingual nerve⁸. This technique anesthetize a wide zone and all the tissue supplied by its distal distribution is anesthetized by this technique. The procedures of posterior teeth of mandible are best performed by anesthetizing the inferior alveolar nerve. The thick buccal cortical plate of posterior mandible does not permit the penetration of local anaesthesia administered by buccal infiltration, and so inferior nerve block is used to anaesthetize the main trunk of nerve¹⁰.

There are certain factors that result in inadequate pain relief during procedures after application of anaesthesia². These factors include patient's level of anxiety, patients pain threshold and body responses to drugs². Sometimes in cases of surgical procedures of teeth associated with periapical pathosis profound anaesthesia is not achieved^{11,12} so, dentist should be aware of these situations and should have a quick solution to

perform pain free treatment. A supplemental technique is found helpful in such cases¹³. This failure is may be because less ionized form of anaesthesia, does not penetrate the nerve membrane due to lowered pH of inflamed tissue^{11,14}.

Several supplemental techniques exists in dentistry that are helpful in achieving anaesthesia in patients that are not completely anesthetized by conventional infiltration and IANB^{2,11}.

Intraligament technique is one of such technique that can help a dentist in improving patient comfort^{2,15,16}. In this technique few drops of anaesthesia are deposited into intraligament spaces of tooth with pressure¹⁷. Intraligament space is basically the space of about 0.4 to 1.5 mm, present between the teeth and its bearing bony socket and contains periodontal ligament fibers². These fibres are composed of connective tissue that attaches the cementum of tooth root to bone.

So we conducted the study to evaluate the efficacy of IANB supplemented by intraligament infiltration in periapical diseased tooth.

MATERIALS AND METHODS

We conducted a study to find out the response of 100 patients with periapical lesion, after administration of supplemental anaesthesia along with nerve block. We collaborated with the Oral medicine department for diagnosis and referral of patients with periapical pathology. All the tooth were mandibular posterior teeth with associated periapical lesion.

Inclusion criteria:

- Posterior mandibular teeth with mobility
- Periapical lesion with draining sinus
- 1mm radiolucency associated with the roots in periapical radiograph

All the patients were given IAN block for extraction with buccal infiltration

Probe was inserted to check the efficacy of anaesthesia on medial and distal sides of buccal sulcus and in lingual sulcus after 4 minutes of administration.

Received on 24-03-2021

Accepted on 19-07-2021

Response was checked by observing patient's response.

- No response 1
- Blinking of eye on probing 2
- Pain on laxation 3
- Pain on applying forces with forceps 4

Patient showing response on any of these was administered intraligamental injection at medial and distal aspect of tooth. Waiting period was 1min and 30 seconds and after that response was noted.

Table 1

Anaesthetic technique	No response on probing	Blinking of eye on probing	Pain on laxation	Pain on applying forces with forceps	n
IAN + buccal infiltration	18(18%)	27(27%)	33(33%)	22(22%)	100
Supplemental Intraligamental infiltration	63(76%)	11(13%)	7(8.5%)	1(1.2%)	82

RESULTS

Results of study showed that there was prominent improvement in the response of patients when they were given supplemental intraligamental anaesthesia, after failure of inferior alveolar nerve block. It was found that 82 patients felt some discomfort during extraction of periapical diseased tooth when they were only anesthetized with inferior alveolar nerve block and buccal infiltration. After that these 82 patients were given supplemental intraligamental anaesthesia and 63 patients responded well. So we can conclude that if tooth associated with periapical disease are given supplemental intraligamental injection along with inferior alveolar nerve block and buccal infiltration, their comfort and cooperation will be improved.

DISCUSSION

Most widely accepted method of attaining anaesthesia for mandibular posterior teeth is inferior alveolar nerve block. But its efficacy and effectiveness depends on many factors¹³. One of the reason of its failure was found to be periapical infections and inflamed tooth.

A report by Hargreaves KM showed that the failure of local anaesthesia was 8 times more in patients with pulpal pathosis with respect to normal patients¹⁴.

The anaesthesia was considered to be effective on the basis if patients shows no response or minimal response on probing as after waiting for 1min 30 sec of administration of anaesthesia. This criteria is used by study of Matthews R too. In their study anaesthesia was considered effective when patients showed minimal or no response to instrumentation¹⁸.

It has been reported in literature by Seema Yadav that success rate of IANB is 30% in patients with pulpal pathosis¹³ but in our study anaesthesia the IAN block was only effective in 18% patients. Another study by Parirokh M showed that their 22.3% patients were successfully anesthetized by IAN block in teeth associated with pulpal pathosis which is quite close to ours results of 18%¹².

So we decided to conduct a study to improve the efficacy of inferior alveolar nerve block by supplementing it

with intraligamental anaesthesia. It was found that in our study 76% of patient's discomfort was relieved when they were given supplemental intraligamental anaesthesia which is comparable to other studies done by Seema Yadav and Hargreaves KM^{13,14}.

Parirokh showed 57.6% success rate in patients that were given combination of IAN block and intraligamental injection. Our success rate was more than Parirokh M¹².

Another study by S Fan supported our conclusion that combination of IAN and intraligamental injection is effective in achieving anaesthesia with periapical infected teeth. He showed that anaesthetic success will improve in patients with irreversible pulpitis in the mandibular first molar if combined technique is used¹⁹.

Similar to our results Aggarwal V also reported that supplemental intraligamental injection improves the efficacy of inferior alveolar nerve block. He reported that 2% lidocaine and 4% articaine when administered intraligamentally, increase the effectiveness of primary anaesthesia by 66% and 78% which is similar to our 76%.⁹¹¹.

Another study by Kämmerer PW also concluded that intraligamental technique is good technique in achieving anaesthesia for extractions²⁰.

Study by S Fang also supported our results that efficacy was improved with supplementary intraligamental injection along with IAN.

CONCLUSION

We have concluded from this study that if tooth associated with periapical disease are given supplemental intraligamental injection along with inferior alveolar nerve block and buccal infiltration, comfort and cooperation of patient will be improved.

Contributions by authors: **SA:** First corresponding author, conducted literature review, compiled results, and wrote the first draft of publication, **FH:** Helped in compiling and interpretation of the results, proof reading of the first and final draft for publication. Supervised the clinical work, data collection, **UM:** Helped to refine the first draft, **SG:** Helped to refine the first draft, **F:** Literature review and refining the literature

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