EVALUATION OF PREFERENCE OF INFILTRATION ANESTHESIA OR NERVE BLOCK DURING TOOTH PREPARATION-A RETROSPECTIVE STUDY

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ABSTRACT:

Local Anesthesia has the capability to block sensory stimuli. Hypersensitivity is experienced during tooth preparation is referred to as Hyperesthesia and it can be managed by giving Infiltration or Nerve Block. A cross-sectional, descriptive study was conducted in a university, on randomly selected individuals. The study group consists of Adult patients who attended the outpatient Department of Prosthodontics from June 2019-March 2020. 86,000 case sheets were reviewed and sampling was done using simple random sampling. A chi square test is done to evaluate the correlation between Sextant and Age with Type of Anesthesia given there is a correlation of Sextant and Anesthesia and there is no correlation of Age and Anesthesia. From the study we can say that most of the students preferred Infiltration Anesthesia over Nerve block Anesthesia during Tooth preparation so it is shown that Infiltration Anesthesia is chosen because it is easy and there is no any clinical complications

Keywords : Anesthesia; Nerve block; Infiltration; Tooth Preparation

I. INTRODUCTION:

Local anesthetics (LA) has the capability to block sensory stimuli that are harmful to the central nervous system. Thus, LA is the most typically utilized technique of achieving pain management in dentistry (Smith and Walton, 1983);(Boling, 1942);(Subasree, Murthykumar and Dhanraj, 2016)

Tsirlis et al. conducted comparative studies of conductivity and intraligamentary anesthesia in tooth preparation of mandibular molars. They found no statistically vital differences within the complications of the inflammation (Berg, 1991; Dabarakis et al., 2006). The clinical efficacy of infiltrative anesthesia is effective for all procedures and local infiltration and/or nerve blocks, i.e., cavity preparations, vital pulpectomies, crown preparation, and dental extractions(Lilienthal, 1975). (Vijayalakshmi and Ganapathy, 2016)

In Maxilla bone is cancellous so profound anesthesia is attained even by Infiltration and in Mandible bone is cortical so nerve block is considered for profound Anesthesia because

The thick cortical plate prevents diffusion of solution into the cancellous bone and, therefore, to the nerves supplying the pulps of the teeth. There are holes in the body of the mandible, however, and these could permit diffusion of solution into the cancellous space. Such holes include the mental foramen and multiple minor perforations, especially in the lingual aspect of the anterior mandible and the retromolar ridge. The mental foramen plays an important role in achieving pulpal anesthesia after a mental and incisive nerve block has been performed. Investigators have suggested that the infiltration anesthetic technique can be a supplementary method used in adults to overcome anesthetic failure that is caused by accessory nerve supply(Rood, 1976)(Ariga et al., 2018)
In sextant 1 and 3 nerve anesthetised are Greater Palatine Nerve (GP), Posterior Superior Alveolar Nerve (PSA), Middle Superior Alveolar Nerve (MSA). In Sextant 2 nerves anesthetised are Anterior Superior Alveolar Nerve (ASA) (or) InfraOrbital Nerve, Nasopalatine Nerve. In Sextant 4 and 5 nerves anesthetised are Inferior Alveolar Nerve, Lingual Nerve, Buccal Nerve. In Sextant 6 nerves anesthetised are Mental Nerve and Buccal Nerve (Bokadia et al., 2018).

Many patients have experienced severe hypersensitivity while doing procedures like tooth preparation. This hypersensitivity is referred to as hyperesthesia, and managed by administering local anesthesia. The commonly used nerve block for Anesthesia is Inferior alveolar nerve block (IANB) and subperiosteal infiltration. This anesthetic technique may be a viable alternative under such conditions. However, the effectiveness of the technique needs to be explored in controlling hypersensitivity during tooth preparation and preference of infiltration (or) nerve block during tooth preparation.

Many studies which involved case reports (Ashok et al., 2014), surveys (Ashok and Suvitha, 2016), systematic reviews (Ganapathy, Kannan and Venugopalan, 2017), (Ganapathy, Kannan and Venugopalan, 2017; Ariga et al., 2018), (Kannan and Venugopalan, 2018), literature reviews (Venugopalan et al., 2014), (Vijayalakshmi and Ganapathy, 2016), (Subasree, Murthykumar and Dhanraj, 2016; Vijayalakshmi and Ganapathy, 2016), (Selvan and Ganapathy, 2016). In Vivo studies, (Jyothi et al., 2017), (Jain, Ranganathan and Ganapathy, 2017), (Duraiasmey et al., 2019). In vitro studies (Ganapathy et al, 2016), (Ajay et al., 2017) and retrospective studies (Basha, Ganapathy and Venugopalan, 2018) were carried out by our team previously. We are currently focusing on epidemiological studies. Previously our team has a rich experience in working on various research projects across multiple disciplines ((Neelakantan et al., 2015; Ramamoorthy, Nivedhitha and Divyanand, 2015; Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Manivannan et al., 2017; Patil et al., 2017; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; Ravindiran and Praveenkumar, 2018; Wahab et al., 2018, Malli Sureshbabu et al., 2019; Mehta et al., 2019; Rajeshkumar et al., 2019; Samuel, Acharya and Rao, 2020; Sathish and Karthick, 2020).

II. MATERIALS AND METHODS:

This retrospective study was done in a university setup in Chennai, India. Ethical clearance was given from the Institutional Human Ethical Committee of Saveetha Dental College and Hospital, SIMATS, Chennai. A Database of 86,000 Patients undergoing dental treatment from June 2019 to March 2020 was reviewed out of which 998 reports were taken and patients with no relevant data for 494 reports were omitted and 504 samples are taken into consideration and accessed for Preference of local Anesthesia for Infiltration or Nerve block during tooth preparation.

Cross verification of data for errors and measures are taken to minimise sampling bias while double blinding the Analyser and Reviewer. The internal and external validity of the sample selected and all the samples are selected based on simple random samples. Descriptive statistics was used to evaluate preference of intraligamentary. The correlation between age, gender, sextant and technique were evaluated and statistics were carried using SPSS Software version 2 by IBM. Statistical test used is ChiSquare and Crosstabs data is evaluated.

III. RESULTS AND DISCUSSION:

A Total of 504 results were accessed for preference of Anesthesia given during Tooth preparation. Out of the results of which 58.9% has preferred Infiltration and 19.6% has preferred Maxilla Nerve block and 21.4% has preferred Mandible Nerve block for tooth preparation (Table 2). According to sextant the Anesthesia used accordingly are 23.4% in sextant 1, 31.7% in sextant 2, 10.1% in sextant 3, 10.5% in sextant 4, 12.7% in sextant 5, 11.5% in sextant 6 (Table 1). The results also showed that Correlation of Sextant and Anesthesia having a p-value of .000 and no correlation of Age and Anesthesia having a p-value of .723 making them significant statistically (Table 3).

**Table 1:** Frequency distribution percent of Anesthesia given according to Sextant shows that sextant 2 by 31.7% followed by sextant 1 by 23.4%, sextant 5 by 12.7%, sextant 6 by 11.5%, sextant 4 by 10.5% and least by sextant 3 10.1%

<table>
<thead>
<tr>
<th>SEXTANT</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td>1</td>
<td>118</td>
<td>23.4%</td>
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Table 2: Frequency distribution of Anesthesia according to Site shows that Infiltration by 58.9% followed by Mandibular Nerveblock in 21.4% and least by Maxillary Nerve block in 19.6%

<table>
<thead>
<tr>
<th>Site</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Infiltration</td>
<td>297</td>
<td>58.9%</td>
</tr>
<tr>
<td>Maxilla Nerve Block</td>
<td>99</td>
<td>19.6%</td>
</tr>
<tr>
<td>Mandible Nerve Block</td>
<td>108</td>
<td>21.4%</td>
</tr>
<tr>
<td>Total</td>
<td>504</td>
<td>100%</td>
</tr>
</tbody>
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Table 3: Pearson's Chi-square Test showing that p value obtained while Correlation of Sextant ,Age with Anesthesia are .000 , .723 respectively, thus making a correlation of Sextant and Anesthesia and no correlation of Age and Anesthesia making them significant statistically

<table>
<thead>
<tr>
<th>ANESTHESIA</th>
<th>SEXTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>238.308</td>
</tr>
<tr>
<td>df</td>
<td>10</td>
</tr>
<tr>
<td>P</td>
<td>.000</td>
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Fig 1: Bar graph depicting the association between different techniques of anesthesia and site of anesthesia, X axis represents type of technique of anesthesia and Y axis represents percentage of population. Correlation of sextant with anesthesia shows graph that depicts Infiltration is most commonly used in sextant 2 followed by sextant 1, sextant 5, sextant 6, sextant 4 and least by sextant 3. Chi Square test represents statistical association between technique and age group having p-value - 0.000 (p value<0.05) statistically significant.
Fig 2: Bar graph depicting the technique of nerve block given during tooth preparation according to sex. X-axis represents the technique of nerve block given during tooth preparation and Y axis represents the percentage of population. The graph shows Infiltration is preferred by Females followed Males and Mandibular Nerve block is preferred by Females and least preferred was Maxillary Nerve block by Females.
Fig 3: Bar graph depicting the technique of nerve block given during tooth preparation according to level of clinical study. X-axis represents the technique of nerve block given during tooth preparation and Y axis represents the percentage of population. The graph shows different type of nerve block anesthesia given during tooth preparation and it represents most of Undergraduates used Infiltration followed by Postgraduates.

Local anesthesia causes loss of sensitivity (pain) around the administration site (infiltration anesthesia) or on the trail of a nerve (nerve block anesthesia). It is also accessible as a topical cream and as an injectable solution (local anesthesia) in dentistry induces an analgesic impact by interacting with neural cell membrane. It results in closure of voltage-gated sodium channels and prevents action potential from occurring and accounts for local activity of the amide-based anesthetic solutions, the foremost unremarkably used inside clinical dentistry include: Bupivacaine, articaine, lidocaine, prilocaine, and mepivacaine. Comparatively insoluble, unstable, and weak basic, LA with buffering HCl acid is used to stabilize the pH of the amide (Jain and Philip, 2012) (Ajay et al., 2017). Since amides cause dilatation and thus decrease the efficacy of the anesthesia, vasoconstrictors such as endocrine and felypressin are typically, reduce the blood flow at the injection site, and increase the period of the anesthetic impact.

The Mandible is formed from by dense cortical bone and it effects the effective infiltration (Hicks, Garcia-Godoy and Flaitz, 2004). There are other techniques which anesthetize the teeth within the mandible with some success: IANB or Inferior alveolar nerve block, buccal nerve block, nerve blocks of the mental and incisive nerves, Gow-Gates mandibular nerve block, Vazirani-Akinsi closed mouth mandibular block, and supplementary intraosseous anesthesia techniques such as intraseptal, periodontal ligament (PDL), and traditional (direct) intraligamentary anesthesia injection (Aimutis, 2004).

The reduction of multiple injections in maxillary tooth preparation reduces the total amount of delivered vasoconstrictor and may be useful for cardiovascular compromised patients that require maxillary anesthesia (Holtzclaw and Toscano, 2008) (Acharya et al., 2010). For maxillary mucogingival procedures, the AMSA or Anterior Middle superior Alveolar nerve block with palatal nerve block delivery of anesthetic with vasoconstrictor provides excellent hemostasis and reduces the need for multiple reinjections to obtain hemostatic.
control (Acharya et al., 2010; Lee, 2016) The palatal injections are generally considered to be most painful injections. Wahl et al. (Wahl et al., 2002) showed that palatal injections causes more pain than other intraoral injections, probably due to the pressure on Periosteum during Tooth preparation.

During a clinical setting, the quick onset, short length, and high effectiveness of Anesthesia is delivered through Infiltration thought to permit operators to begin their procedures additional quickly and see additional patients throughout the day, especially advantageous for clinicians’ performing Tooth preparation (Shen et al., 2001) Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Varthan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020). We hope this study adds to this rich legacy.

There are few limitations with intraligamentary anesthesia, one is technique sensitivity and multiple puncture sites. However, there are several advantages such as minimal tissue trauma, profound anesthesia, no risk of hematoma or trismus and minimal anesthetic recovery discomfort, and is easy to perform and technique sensitive and generally practised during Tooth preparation.

LIMITATIONS: Since the study included dental students, the possibility of standard operating protocols set by the university and the heterogeneity of faculty guiding the procedure may influence the outcome.

IV. CONCLUSION:

Within its limitations, this study concludes that the majority of students preferred Infiltration anesthesia than nerve block whenever possible which includes sextant 5 where the mental nerve block is also indicated for tooth preparation. Some students preferred to use a nerve block in the maxilla and was attributed to multiple tooth preparation. In the sextants 4 and 6 students were bound to use nerve blocks due to the dense bone and inability of local anesthesia to penetrate through the bone.

REFERENCES:


