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AVERAGE TIME TAKEN TO ANAESTHETIZE CENTRAL INCISOR FOLLOWING INFERIOR ALVEOLAR NERVE BLOCK

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ABSTRACT

Introduction

The commonly used alveolar nerve block is the most well-known method utilized in dentistry for anaesthesia and numerous further developments of the customary nerve block have been as of late being seen more in theory. Choosing the best method by the dental specialist relies upon many elements including the achievement rate and intricacies identified with the chosen strategy. Dental specialists ought to know about the accessible current developments of the inferior alveolar nerve block procedures to pick between them. A few administrators might experience trouble in distinguishing the anatomical landmarks which are helpful in applying the nerve block and depend rather on suppository evidence concerning where the needle ought to be situated for delivering this block. Such assumptions can prompt late effect of the anaesthesia or the block may also be a failure, moreover the failure rate of inferior alveolar nerve block has been accounted for to be around 20-25% which is viewed as exceptionally high.

Materials and Methods

984 instances where patients who visited Saveetha Dental College and Hospital, with chief complaints of caries or pain in the lower arch with teeth indicated for extraction and were administered with inferior alveolar nerve were selected for the study. Their age ranged from 20 to 60 years. Reasons for extraction were commonly found to be caries. Ethics board approval was obtained. Data collected were tabulated in Excel and was imported into SPSS by software and a chi-square test was done to analyse the significance.

Result

Of the total 984 sample size, 24.4% were third year undergraduates ,33.1% were final year undergraduates and 42.5% were undergraduate interns. The undergraduate interns showed the maximum success rate with minimum time taken to anaesthetise central incisors following inferior alveolar nerve block while the third year undergraduates were found to be having a higher average time and failure rates as well.

Conclusion

According to this study, the average time taken decreases with increase in experience as well as success rates. Thus, this study shows that with experience and practice we get better results over time.

Keywords- Innovative technique, mandibular nerve block, local anaesthesia, inferior alveolar nerve block.

INTRODUCTION

The biggest branch of the trigeminal nerve, the mandibular branch (V3), is both sensory and motor. The sensory root emerges from the trigeminal ganglion, though the motor root emerges from the motor nucleus of the pons and medulla oblongata. The sensory root goes through the foramen ovale immediately after separating from the trigeminal ganglion. The motor root passes under the ganglion and through the foramen ovale to join with the sensory root right outside the skull, shaping the primary trunk of the mandibular nerve. The nerve then, at that point separates into anterior and posterior divisions. The mandibular nerve radiates branches from its primary trunk just as from the anterior and posterior divisions. (1)

The posterior division of the mandibular branch radiates two tangible branches (the auriculotemporal and lingual nerves) and one branch comprises both sensory and motor strands (the inferior alveolar nerve). The inferior alveolar part of the mandibular nerve plunges in the district between the lateral part of the sphenomandibular tendon and the medial part of the ramus of the mandible. (2)It goes alongside, however parallel and back to, the lingual nerve. While the lingual nerve keeps on diving inside the pterygomandibular space, the inferior alveolar nerve enters the mandibular canal through the mandibular foramen. (3)Not long prior to entering the mandibular canal, the inferior alveolar nerve emits a small motor branch known as the mylohyoid nerve. The nerve goes along with the inferior alveolar artery and vein inside the mandibular canal and partitions into the mental and incisive nerve branches at the mental foramen. The inferior alveolar nerve gives sensation to the posterior mandibular teeth. The incisive nerve is a part of the inferior alveolar nerve that runs

inside the mandibular canal to give sensory innervation to the anterior mandibular teeth. The mental nerve rises out of the mental foramen to give sensory innervation to the mucosa in the premolar/canine locale, just as to the skin of the jawline and lower lip.(4) The mylohyoid nerve branches off the inferior alveolar nerve before its entrance into the mandibular canal. It goes inside the mylohyoid groove and along the body of the mandible on the medial aspect to supply the mylohyoid muscle just as the anterior belly of the digastric muscle.

The inferior alveolar nerve block is the most widely recognized method utilized in dentistry. Regardless of its significance, it is related to a rate of failure of 15-20%, a figure which accounts for the most elevated level of all clinical failures observed while using local anaesthesia. The customary technique for anaesthesia of the inferior alveolar nerve includes the insertion of the needle close to the mandibular foramen, where the inferior alveolar nerve is situated before it enters the foramen. Some significant landmarks should be perceived by the administrator to decrease the incidence of failure following the utilization of this procedure. Radiographs are normally accessible for most patients before treatment and numerous dental specialists focus on the data identified with the dentition and jaw as found in these radiographs, however may not utilize them to assess the area of the mandibular foramen and other difficult to locate landmarks utilized in the inferior alveolar nerve block. Many investigations have shown that the mandibular foramen can without much of a stretch be situated on an orthopantomogram (OPG) radiograph.(5)(6)

Furthermore, there are three strategies for the nerve block, The inferior alveolar nerve block (IANB), Gow-Gates (GG) and Vazirani-Akinosis methods.(7) In this procedure, the line portrayed for the path of insertion of the needle is somewhere around three-fourths the distance between the coronoid notch and the posterior border of the mandible and is not unmistakable, hence taking into account an extensive failure rate. The determination of the site of introductory needle landmarks depicted by Malamed are hard to recognize and when applied by clinical students can cause high failure rates. There are a few variables which influence the inferior alveolar nerve blocks achievement rate including: patient fear of getting the sedative medication, fundamental difficulty of intraoral infusion, biologic variations dependable on the medications, physical attributes, infections and diseases, bifid mandibular nerve, extra mental foramen, anastomoses, and so on. This study aims to prospectively analyse and assess the average time taken to anaesthetise central incisor of the same side following inferior alveolar nerve block. Our team has extensive knowledge and research experience that has translate into high quality publications (8–27)

MATERIALS AND METHODS

Study setting

This was a university dental hospital based prospective, cross sectional study conducted among patients visiting a University dental hospital in Chennai. Since this was a University hospital setting, distribution of population contributes to a major advantage for this study. Data collected was reliable and with evidence. This study was approved by the Institutional Review Board.

Sampling

The study population was 984 instances where patients who visited Saveetha Dental College and Hospital, with chief complaints of caries or pain in the lower arch with teeth indicated for extraction and were administered with inferior alveolar nerve were selected for the study from June 2019 to March 2021. Patients with various chronic types of cardiac disease were noted. Independent variables were demographics such as age, gender etc. Dependent variable was the administration of the nerve block. The data collected were tabulated in excel.

Data Analysis:

Microsoft Excel was used for tabulation of the parameters and then the data was exported to the SPSS software version 23.0

Descriptive statistics and relation between variables was determined using the chi-square test, where $p<0.05$ was considered statistically significant.

RESULTS

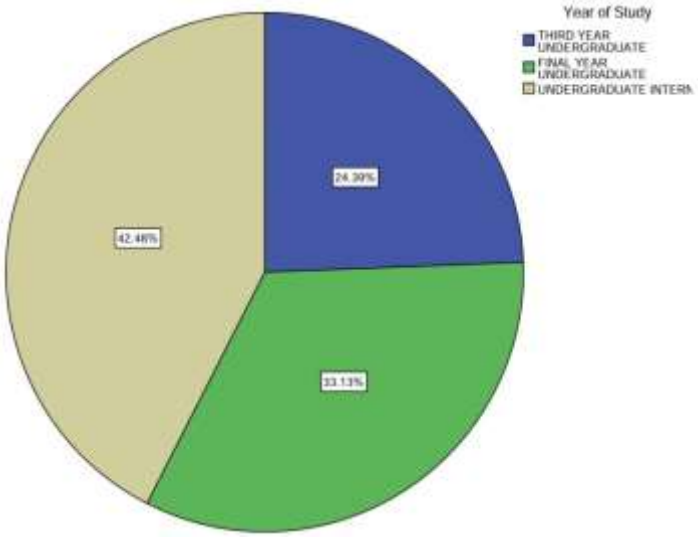

Fig 1: Pie chart showing the year of study of the administrators of inferior alveolar nerve block. 24.4% were third year undergraduates (blue) ,33.1% were final year undergraduates (green) and 42.5% (beige) were undergraduate interns

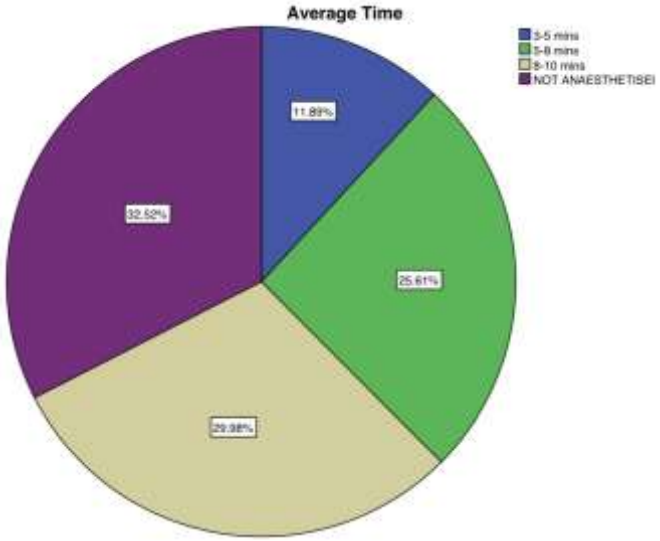

Fig 2: Pie chart representing the average time taken for anaesthesia of central incisor. 11.9% took an average of 3-5 minutes, 25.6% took an average of about 5-8 minutes , 30% took about 5-8 mins while in 32.5% of the instances, the central incisor was not anaesthetised.

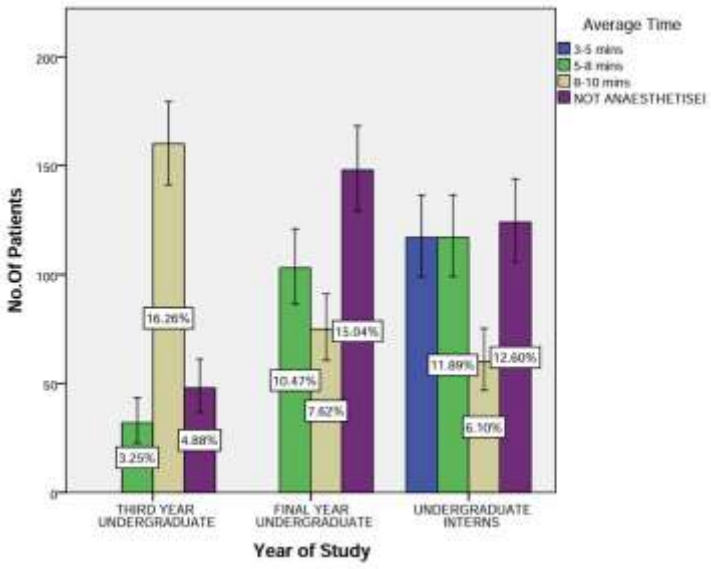

Fig 3: Bar chart showing the correlation between year of study and average time taken. Of the 24.4% third year undergraduates, none of them anaesthetised the central incisor within 3-5 mins, in 3.25% instances, average time taken was between 5-8 minutes, in 16.26% instances within 8-10 minutes and in 4.88% instances the central incisor was not anaesthetised at all. Of the 33.1% final year undergraduates, none of them anaesthetised the central incisor within 3-5 mins, in 10.47% instances, average time taken was between 5-8 minutes, in 7.62% instances within 8-10 minutes and in 15.04% instances the central incisor was not anaesthetised at all. Of the 42.5% undergraduate interns, 11.89% of the instances, anaesthetised the central incisor within 3-5 mins, in 11.89% instances, average time taken was between 5-8 minutes, in 6.10% instances within 8-10 minutes and in 12.60% instances the central incisor was not anaesthetised at all. Chi square value is 130.74 ,Df value is 3, p value is 0.00 which is <0.05 and is hence statistically significant.

According to the data collected and analysed in this study between the last 2 years, Of the total 984 sample size, 24.4% were third year undergraduates ,33.1% were final year undergraduates and 42.5% were undergraduate interns. Of the total patients, 51.7% were females while 48.3% were males. According to this study, 11.9% took an average of 3-5 minutes, 25.6% took an average of about 5-8 minutes , 30% took about 5-8 mins while in 32.5% of the instances, the central incisor was not anaesthetised. Of the 24.4% third year undergraduates, none of them anaesthetised the central incisor within 3-5 mins, in 3.25% instances, average time taken was between 5-8 minutes, in 16.26% instances within 8-10 minutes and in 4.88% instances the central incisor was not anaesthetised at all. Of the 33.1% final year undergraduates, none of them anaesthetised the central incisor within 3-5 mins, in 10.47% instances, average time taken was between 5-8 minutes, in 7.62% instances within 8-10 minutes and in 15.04% instances the central incisor was not anaesthetised at all. Of the 42.5% undergraduate interns, 11.89% of the instances, anaesthetised the central incisor within 3-5 mins, in 11.89% instances, average time taken was between 5-8 minutes, in 6.10% instances within 8-10 minutes and in 12.60% instances the central incisor was not anaesthetised at all.

DISCUSSION

Mandibular anaesthesia is a fundamental piece of clinical practice and for dental surgeries. Because of different variables, anaesthesia of the mandibular nerve is related with a serious level of failures, particularly with the utilization of unaccepted or faulty methodology. Failure of the block can prove difficult for the clinician to comprehend. (28)In an instance of mandibular block failure, it is important for the clinician to reassess their administration strategy as well as other anatomical and physiological factors to find out the root cause of the failure.

The average time taken for any maxillary or mandibular local anaesthesia to act is around 3-5 minutes. (29)Hence the average time taken was tabulated according to the range of 3-5 minutes, 5-8 minutes and 8-10 minutes. Based on the year of study the results are segregated and analysed so as to determine the reason for the instances where there was either failure of the block or failure in its effectiveness based on the knowledge and practice of the administrator.

The successful administration of the inferior alveolar nerve block depends on the administrator's prior knowledge regarding the pterygomandibular space. Notwithstanding the inferior alveolar and lingual nerves, different landmarks in this space are of specific importance for successful administration of local anaesthesia, including the inferior alveolar vessels, the sphenomandibular tendon and the pterygomandibular raphe.(30) These factors can all possibly affect the adequacy of local anaesthesia and hence inadequate administration may also play a role on the success of the block. More noteworthy comprehension of the nature and degree of variety in intraoral structures and anatomical landmarks should prompt further improvement in success rates, and give more precise and faster acting anaesthesia. The direct block for the inferior alveolar nerve is utilized habitually by most clinicians and this investigation assesses its physical reasoning and potential clarifications for its failure.(31)

LAs reversibly hinder nerve transmission by restricting voltage-gated sodium channels in the nerve plasma layer. Sodium channels are vital layer proteins, secured in the plasma film. At the point when LAs block the sodium channel, they render it impermeable to Na, which forestalls action potential activation and transmission. LAs are feeble bases that exist in solution form in both charged and uncharged structures. All clinically-utilized LAs share certain underlying provisions. The aromatic (benzene) ring prompts more noteworthy lipid solvency. Lipid dissolvability decreases (and fluid solvency increments) when the amine nitrogen is protonated (quaternary). At the point when this amine nitrogen is in a tertiary structure, it is uncharged and more lipid dissolvable. The uncharged, more lipophilic structure all the more promptly pervades nerve films, though the charged, more water solvent structure blocks the sodium channel. LAs (save for benzocaine) are provided in quaternary structure as hydrochloride salts. The extent of charged and uncharged structures (and, as an outcome, the speed with which they pervade the plasma layer and produce their clinical results) is dictated by the pKa of the medication, and in vivo, by tissue pH.

According to a study,(32) even though different techniques seemed to exhibit different rates of success, the time taken for the drug to act seemed to remain the same irrespective of the technique used, this shows that even though the different methods may be chosen by different administrators based on their knowledge and practice, the time taken seems to be unaffected by the technique used for administration.

CONCLUSION

Within the limits of the study, the undergraduate interns have exhibited a higher rate of success and faster rate of action followed by the final years and finally the third years. Thus, this study concludes that with better knowledge and practice of better techniques higher rates of success can be achieved.

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NishanthanaMurali contributed to data collection, analysis and interpretation and drafting of the article. Dr. Rubin S John contributed to the critical revision of the article.

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CONFLICT OF INTEREST:

No potential conflict of interest relevant to this article was reported.

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