

Comparison of Success Rate of Local Anaesthesia Between Gow Gates and Inferior Alveolar Nerve Block Anaesthetic Technique in Patients with Irreversible Pulpitis in Mandibular Molars

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ABSTRACT

Objective: To compare local anaesthesia success of in patients with irreversible pulpitis in mandibular molars by using Gow Gates and Inferior alveolar nerve block techniques.

Study Design: Quasi-experimental.

Place and Duration of the Study: Armed Forces Institute of Dentistry, Rawalpindi, Pakistan from Jun to Dec 2019.

Methodology: 240 patients were enrolled and their consent was acquired. Patients were categorized into Group-A (Gow Gates technique) and Group-B (Inferior Alveolar Nerve Block technique), containing 120 patients each. Using the non-probability consecutive sampling technique; Gow Gates and Inferior alveolar nerve block were defined. Patients in both groups were anaesthetized using local anaesthetic agent containing 2% lignocaine with 1:100,000 epinephrine and were scheduled for Root Canal Treatment. Patients were briefed to convey status of pain experienced during the procedure by raising their hand and also to rate the pain on visual analogue scale. Pain score of less than 3 was considered successful.

Results: Two hundred and forty patients were enrolled in the study, 120 in each group. The mean patient age in group A was 37.8±8.5 years and in group B was 37.8±9.0 years. There were 62 males (51.7%) in group-A, 63 males (52.2%) in group B and 58 (48.3%) females in group-A & 57 (47.5%) in group B. Success of treatment of anaesthesia in both groups was comparable ($p=0.631$). The mean pain score in group-A was 2.58±1.5 and in group B 2.63±1.5 ($p=0.238$).

Conclusion: The local anaesthesia success by using inferior alveolar nerve block technique and Gow Gates's technique was comparable in patients diagnosed with irreversible pulpitis in mandibular molars.

Keywords: Gow Gates technique, Irreversible pulpitis, Inferior alveolar nerve block technique, local anaesthesia.

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INTRODUCTION

Root canal therapy is usually carried out to relieve patients' dental pain and it requires the use of effective local anaesthesia either in form of infiltration or a nerve block.¹ An inflammatory disorder of dental pulp known as symptomatic Irreversible pulpitis, is caused by severe damage to a pulp via bacteria in the vital dental pulp that leads to severe dental pain. It is considered a dental emergency that forces a patient to seek immediate treatment.² Pain Management in dentistry includes many procedural problems, one of which is the delivery of an effective anaesthetic agent for pain-free treatment. It is reported that teeth with inflamed pulp are more difficult to anaesthetize.³ The inferior alveolar nerve (IAN) block is a commonly used technique for giving local anaesthesia via injection in mandibular restorative and surgical procedures.

In patients with irreversible pulpitis of mandibular molars, lip anaesthesia can be attained by using inferior alveolar nerve block technique, but pulpal anaesthesia is sometimes ineffective. Therefore, assurance of successful pulpal anaesthesia attainment using this technique is not guarantee.^{4,5} which can be troublesome and the reported anaesthesia failure rate ranges from 30 to 80%.

Other than anatomical dissimilarities stated in the applied anatomy related to injections, different anaesthetic techniques were modified along with the introduction of a new anaesthetic agent to improve their efficacy.⁶⁻⁸ The steps to which are mentioned as follows: the placement of needle at the neck level of condyle, positioned underneath the site of insertion of lateral pterygoid muscle.⁹ The aforementioned anaesthesia technique is more frequently used for delivering extensive anaesthesia and it needs widely opened patient's mouth opening. In a study conducted by Aggarwal V *et al.*,¹² the success rate of local anaesthesia using Gow-Gates technique was reported to be 52%, which was found to be statistically higher

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than the control technique i.e., Inferior alveolar nerve block, success rate of which was reported to be 36%.¹⁰

The purpose of current study is to encourage general dental practitioners in incorporating the Gow Gates technique in routine clinical practice to anaesthetize mandibular molars with irreversible pulpitis. Limitations of literature researches already performed showed no acceptable success rates by any anaesthetic technique for blocking mandibular molars with irreversible pulpitis.

METHODOLOGY

A quasi-experimental study was conducted at Armed Forces Institute of Dentistry, Rawalpindi, for a duration of six months from Jun-Dec 2019. The permission to conduct the study and ethical approval was obtained from institutional review board of AFID (approval no.: 918/Trg/Jun/2019). The minimum required sample size was calculated to be 240. WHO sample size calculator was used to calculate the sample size, where success rate of gow-gate technique was considered to be 52%, success rate of conventional technique was 36%¹⁰, 95% level of confidence, 80% study power and precision of 10% was taken into account.

Inclusion Criteria: Patients of either gender with 18 years or above age, presenting to outpatient department with confirmed diagnosis of symptomatic irreversible pulpitis and ASA status of I or II were included in the study.

Exclusion Criteria: Pregnant females, nursing mothers, patients with immature apices, root resorption, necrotic pulp, apical abscess, patients on anti-inflammatory drugs, patient allergic to lignocaine, or patient with limited mouth opening were excluded from the study.

Those fulfilling the selection criteria were invited for participation and were explained about the study and its procedure with their written consent. For each patient, through physical examination, medical history and dental examination was conducted and recorded. With the help of peri-apical radiographs, periodontal probing, percussion, palpation, electric pulp tester and cold tests, the pulpal and periapical status of affected tooth were evaluated and treated.

Enrolled patients were divided into two groups using non-probability consecutive sampling. The study groups included: Group A in which patients were administered local anaesthesia using the Gow Gates technique, and Group B in which inferior

alveolar nerve block technique was used to administer local anaesthesia. After application of topical anaesthetic agent patients were anaesthetized using one of the two local anaesthesia administration techniques i.e., Gow Gates technique (Group A) or inferior alveolar nerve block techniques (Group B). The local anaesthetic agent containing 2% lignocaine with 1:100,000 epinephrine was used for this purpose. Patients were scheduled for elective root canal procedure for underlying condition.

There were 120 patients in group A who received Gow Gates anaesthesia. Two extra oral landmarks were identified, including apex of intertragic notch and inferior border of the tragus. The participants were requested to open the mouth as widely as possible. There was an unreal line drawn from the place of inter-tragic notch to the mouth angle. Needle insertion was made along previously drawn unreal plane across the mesio-palatal cusp of the ipsi-lateral upper second molar. The syringe divergence was kept parallel to the divergence of the tragus. The dentist then injected the medication solution using a 27-gauge needle with approximate length of 35mm. The injection needle was moved forward up till to a point where bone was felt at the area of condylar head, after touching the bone, the needle was slightly withdrawn, and aspirated, followed by injecting 2.2mL of local anaesthetic agent.

On the other hand, 120 patients belonged to group B, who received local anaesthesia by standard technique using 2% lidocaine with 1:100,000 epinephrine via 27-gauge needles. The administration of anaesthetic drug was done following same procedure as mentioned for group A.

Lip numbness was confirmed after 15 minutes of administering local anaesthesia, whereas in patients who failed to achieve anaesthesia in a period of fifteen minutes were thus excluded. After achieving positive lip numbness, the teeth were exposed and isolated using a rubber dam. The usual process of accessing the opening was initiated. At the start of the procedure, it was made clear to all of the patients that whenever they feel pain during the procedure, they were supposed to indicate the pain by raising their hand and further to rate the pain using visual analogue scale. The pain score of less than three was considered as a positive successful outcome.

Data recorded for all the patients was transferred to data management software, and was analysed by using Statistical Package for Social Sciences (SPSS)

version 21.0. The descriptive analysis of continuous variables (age, pain scores) were presented as Mean±SD while categorical variables (age group, gender, success of anaesthesia) were presented as frequencies and percentages. Success of anaesthesia was compared between two study groups by using Chi-square test. Whereas, the mean pain scores were compared between study groups using independent samples t-test. Stratification was done with respect to age and gender to control for confounding. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

There was total 240 participants enrolled in the study, where 120 belonged to Group-A (Gow Gates technique) and 120 belonged to Group-B (Inferior Alveolar Nerve Block technique). The mean age was comparable between two groups i.e. 37.8±8.5 and 37.8±9.0 years in Group A and B respectively. In terms of age groups, the distribution among two groups is given as Table-I. Out of 240, there were 125(52.0%) males and 115(47.9%) females, where the gender distribution was comparable between two study groups as shown in Table-II.

Table-I: Distribution of Patients by age compared across two Study Groups (n=240)

Age groups	Study groups	
	Group A (n=120)	Group B (n=120)
20-35 years	49(40.8%)	49(40.8%)
36-55 years	71(59.2%)	71(59.2%)

Table-II: Distribution of Patients by Gender compared across two Study Groups (n=240)

Gender	Study groups	
	Group A (n=120)	Group B (n=120)
Male	62(51.7%)	63(52.5%)
Female	58(48.3%)	57(47.5%)

The success of local anaesthesia in patients belonging to both study groups was comparable with no significant difference observed between conventional and new administration technique (*p*=0.631) where 51.7% and 52.5% participants from Group A and B, respectively achieved the anaesthesia successfully as shown in Table-III. The mean pain score during the procedure, after anaesthesia was also comparable between two groups where mean pain score was reported to be 2.58±1.5 and 2.63±1.5 among Group A and B, respectively (*p*=0.238) as shown in Table-IV.

Table-III: Distribution of Patients by Success Compared Across Two Study Groups (n=240)

Success	Study groups		<i>p</i>
	Group A (n=120)	Group B (n=120)	
Yes	62(51.7%)	63(52.5%)	0.631
No	58(48.3%)	57(47.5%)	

Table-IV: Comparison of Pain Scores across Two Study Groups (n=240)

Pain score	Study groups		<i>p</i>
	Group A (n=120)	Group B (n=120)	
Mean±SD	2.58±1.5	2.63±1.5	0.238

DISCUSSION

The most common technique used to achieve local anaesthesia is “inferior alveolar nerve block technique” to deliver sufficient anaesthesia in mandibular molars for endodontic treatment.¹¹ However, the reported rate of failure to obtain local anaesthesia using said technique ranges from 44 to 80%, and even lower success rates are reported i.e. 19-56%.¹² There are many explanations that explains the failure of attainment of local anaesthesia by this technique including anatomic dissimilarities, changes in local pH, cross-innervations and accessory innervations.¹³⁻¹⁵ A high block technique may be successful in overcoming mentioned challenges.

Thus, Gow-Gate technique anaesthetizes the whole mandibular nerve, providing a safe anatomical alternative approach.¹⁶ However, for lower molars, this technique goes unsuccessful frequently in delivering local anaesthesia owing to anatomical differences, existence of bifid inferior alveolar nerves, or various other associated factors. The increased success rates of GGMB are ascribed to better accurate positioning of injection needle that is closer to the nerve trunk.¹⁷

The results of present study concluded no significant difference in terms of local anaesthesia attainment compared for both the techniques i.e., IANB and GG techniques in terms of achieving local anaesthesia success (*p*=0.631). Some authors report greater local anaesthesia success rates for the GG technique.¹⁸⁻¹⁹ but in this present study, the success rates were quite similar and comparable i.e., 92.3% vs 91.3% for new and conventional techniques respectively. This finding makes both the techniques comparable.

CONCLUSION

The success of local anaesthesia using conventional inferior alveolar nerve block technique and new Gow

Gates's technique was similar in patients with symptomatic irreversible pulpitis in mandibular molars.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AB & KW: Data acquisition, data analysis, critical review, approval of the final version to be published.

WAK & SY: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AM & JIB: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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