

Comparison Of Anaesthetic Efficacy Of Inferior Alveolar, Gow-Gates And Vazirani-Akinosi Technique In Dentoalveolar Surgery

Aishwarya U Mundodi*, Ravi S. Patil**, Shivaraj S. Wagdargi**, Chitra Chakravarthy**

*PG Student, **Professor. Department Of Oral & Maxillofacial Surgery, Navodaya Dental College And Hospital, Raichur, 584103, Karnataka, India.

Abstract: Background: Inferior alveolar nerve block has been widely used to anaesthetise the mandibular teeth. The other alternatives include the Gow-Gates and the Vazirani-Akinosi technique. This study aims to compare these three techniques of anaesthesia for posterior mandibular dentoalveolar surgery. Material & Method: Thirty subjects were equally distributed into three groups receiving the specific injection technique assigned to the group. The injection technique was performed using 3.6ml of 2% lignocaine with 1: 200000 adrenaline and clinical parameters such as onset of anaesthesia, pain in the injection site, extent of soft tissue anaesthesia and success rate of each block was assessed. Visual Analogue Scale was used to assess the pain experienced by the patient during the extraction procedure. Results: It was noted that the time taken for the onset of anaesthesia was the same in all the three groups. Vazirani-Akinosi group patients experienced significantly more pain on injection and during extraction of the tooth. Greater extent of soft tissue anaesthesia was seen with the Gow-Gates technique when compared to the other two techniques. Conclusion: Gow-Gates technique demonstrated better efficiency when compared to the inferior alveolar or the Vazirani-Akinosi technique. [Uthappa A Natl J Integr Res Med, 2021; 12(2):33-38]

Key Words: Anaesthesia, Gow-Gates technique, Inferior-alveolar nerve block, Lignocaine, Vazirani-Akinosi

Author for correspondence: Dr. Chitra Chakravarthy, Navodaya Dental College and Hospital, Navodaya Nagar, Mantralayam Road, Raichur, 584103, Karnataka, India. Mobile: +919866627727

E-Mail: chitrachakravarthy@yahoo.com

Introduction: Pain is the most common reason for a person to seek medical advice. In dentistry, most of the minor surgical procedures are done under local anaesthesia which inhibits the nerve conduction, thus blocking the pain. Conventional inferior alveolar nerve block was first introduced by William S. Halsted and Richard J. Hall in 1884 and is still one of the most frequently used techniques for mandibular anaesthesia¹.

Gow-Gates introduced a technique in 1973 which uses extra oral landmarks with the target area being the neck of the condyle approached intraorally¹. Vazirani and Akinosi introduced another technique in the year 1960 and 1977 which was later named as Vazirani - Akinosi technique.

It is a closed mouth technique with the landmark for needle penetration being the mucogingival junction of the upper second molar². These techniques have gained popularity in recent years. It has been noted that most of the patients generally experience pain during the administration of inferior alveolar nerve block and also during the surgical procedure. Therefore, the purpose of this prospective, randomized study was to compare the efficiency

of the nerve block obtained with the conventional inferior alveolar, the Gow-Gates and the Vazirani-Akinosi techniques for posterior mandibular dentoalveolar surgery.

Material and Methods: Thirty subjects were included in this study and were divided into three groups of ten each. Patients with decayed lower molars advised for extraction who reported to our department were included in the study. All patients were healthy and were above thirteen years of age with no systemic diseases. Patients allergic to local anaesthesia, under medications like NSAIDs and opioids, tooth with acute dental infection and pregnant women were excluded from the study. Informed consent was obtained from each patient. Ethical clearance was obtained from the institutional ethics committee.

Patients in group A received an inferior alveolar nerve block (Figure-1), Group B received the Gow-Gates technique (Figure-2) and Group C received the Vazirani-Akinosi technique (Figure-3). 3.6ml of 2% lidocaine with 1:200,000 epinephrine (Lox 2% With Adrenaline) was used for all three techniques using a 5ml syringe with 24gauge needle. Topical anaesthesia was not used in this study. Objective symptoms were

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tested after 3 minutes by probing with a blunt instrument on the buccal and lingual gingiva in relation to the first molar. All three techniques of anaesthesia were compared based on the following clinical parameters which included pain in injection site at the time of injection, onset of anaesthesia, extent of soft tissue anaesthesia, pain during extraction, incidence of positive aspiration during administration of local anesthetic solution and success rate of the nerve block.

Figure 1: Inferior Alveolar Nerve Block Technique(Group A)



Figure 2: Gow-Gates Technique (Group B)



Figure 3: Vazirani-Akinosi Technique (Group C)



Immediately after injecting the local anaesthetic solution, the patient was asked to rate the pain in the injection site using a 4 point scale. [0 – no pain, 1 – mild pain (pain that was recognizable but not discomforting), 2 – moderate pain (discomforting but bearable), severe pain (caused considerable discomfort and was difficult to bear) Onset of anaesthesia was documented as the time taken from the insertion of the needle until a complete numbness of one half of the lower lip

was obtained. This was measured and noted in minutes. Extent of soft tissue anaesthesia was noted based on objective symptoms. The surgeon assessed the areas anesthetized by probing with a blunt instrument on the buccal and lingual mucosa over the first molar region as well as on the lower lip on the side of anaesthesia and noted it as objective symptoms. When the ipsilateral lip numbness was not obtained, it was noted and the same block was repeated. Gingiva around the lower molar was reflected using a periosteal elevator after which the tooth was extracted using extraction forceps. After the procedure, the patient was asked to rate the pain during extraction using a visual analogue scale.

Any incidence of positive aspiration during administration of local anaesthetic solution was noted. The success rate of the nerve block was assessed based on pain during extraction. All the injection techniques were performed by the same maxillofacial surgeon. The findings of the study were subjected for further statistical analysis and results were tabulated by one way ANOVA test.

Results: 30 adult subjects between 20 and 60 years of age participated in the study which included 14 male and 16 female patients. Patients experienced mild pain on injection for Vazirani-Akinosi and Gow-Gates injection techniques when compared to the moderate pain experienced with inferior alveolar nerve block and therefore, it was noted that the patients in group A experienced significantly more pain when compared to the patients in the group B and group C. Results were tabulated and analysed (Table1).

Table 1: One Way Anova: (Pain At The Site Of Injection Is Compared Between 3 Techniques)

		Sum of Squares	df	Mean Square	F	Sig.
Pain In The Injection Site (4 Point Scale)	Between Groups	3.000	2	1.500	3.652	.044
	Within Groups	8.625	21	.411		
	Total	11.625	23			

*. The mean difference is significant at the 0.05 level i.e P = 0.044 < 0.05, df- degree of freedom, F-Fischer’s exact test, Sig- significant value(p value).

The onset of anaesthesia was the longest for the Vazirani-Akinosi group (group C) approximately 5-8 minutes when compared to the patients in

group A and B where it took 3-5mins for the onset of anaesthesia. This was however, not statistically significant (Table2).

Table 2: One Way Anova: (Onset Of Anaesthesia Is Compared Between 3 Techniques)

		Sum of Squares	df	Mean Square	F	Sig.
Onset Of Anaesthesia (Minutes)	Between Groups	11.583	2	5.792	.937	.407
	Within Groups	129.750	21	6.179		
	Total	141.333	23			

*. The mean difference is significant at the 0.05 level i.e $P = 0.407 > 0.05$.

Patients in Group A and Group C perceived anaesthesia on the buccal mucoperiosteum upto the midline, lingual mucoperiosteum and the floor of the mouth, anterior 2/3rd of the tongue and half of the lip in most of the cases. Three patients in group C did not perceive anaesthesia of the lower lip and in two patients; the lingual mucoperiosteum was minimally anaesthetised. An additional long buccal nerve block was required for all the patients in group A and in

three patients of group C. The extent of soft tissue anaesthesia for patients in group B was noted in buccal and lingual mucoperiosteum, buccal mucosa, floor of the mouth, anterior 2/3rd of the tongue and half of the lip. Additionally the skin over the zygoma, external ear and posterior aspect of the cheek was also anaesthetised. Gow-Gates had greater extent of soft tissue anaesthesia followed by inferior alveolar and then lastly the Vazirani-Akinosi technique. The difference in the extent of soft tissue anaesthesia in group B was statistically significant when compared to the other 2 groups (Table3).

Table 3: One Way Anova: (Extent Of Soft Tissue Anaesthesia Is Compared Between 3 techniques)

		Sum of Squares	df	Mean Square	F	Sig.
Extent Of Soft Tissue Anaesthesia (Blunt Instrument)	Between Groups	2.771	2	1.385	6.510	.006
	Within Groups	4.469	21	.213		
	Total	7.240	23			

*. The mean difference is significant at the 0.05 level.

A statistically significant difference was noted among the three groups when assessing the pain during extraction (table 4). All patients in group B

were totally pain free whereas 30% of the patients from group A experienced mild pain on extraction. 50% of the patients from group C experienced significant pain and required additional infiltration for a pain free extraction.

Table 4: One Way Anova: (Pain During Extraction Is Compared Between 3 Techniques)

		Sum of Squares	df	Mean Square	F	Sig.
Pain During Extraction (Visual Analogue Scale)	Between Groups	23.083	2	11.542	3.982	.034
	Within Groups	60.875	21	2.899		
	Total	83.958	23			

*. The mean difference is significant at the 0.05 level.

Three patients in group A demonstrated positive aspiration during the procedure. There was no positive aspiration noted in group B and group C. Success of anaesthesia was greater with group B (84%) when compared to group A (73%) and group C (65%).

Discussion: Mandible has a dense cortical bone when compared to maxilla which is highly porous. This requires the anaesthetic technique to be more precise and accurate. Mandibular anaesthesia has a failure rate of 48% being reported in literature³. Inferior alveolar nerve technique is performed based on intraoral soft tissue landmarks which are difficult to locate⁴ and varies anatomically⁵. Gow-Gates technique can

be performed on the basis of an extra-oral landmark (line drawn from angle of the mouth to the intertragic notch of the ear), which makes it easier for the beginners to perform this anaesthetic technique.

In our study, 45% of the patients who received the inferior alveolar nerve block reported moderate pain in the injection site. Pain with inferior alveolar nerve technique could be attributed to the fact that sharp end of the syringe comes in contact with the periosteum of the bone⁶. Nusstein and Beck⁷ reported 14-22% incidence of moderate to severe pain on needle insertion for the inferior alveolar nerve block.

The onset of anaesthesia was the longest for the Vazirani-Akinosi group, approximately 5-8 minutes. Yucel et al⁸ have also reported an increased time for onset of anaesthesia with the Vazirani-Akinosi technique, with the possible reason being differences in nerve distribution.

Vazirani-Akinosi technique being a closed mouth technique can particularly be used for patients with trismus. In our study, in 30% of the patients, Vazirani-Akinosi technique failed to anaesthetise the buccal tissues and the patients required additional buccal nerve block for the extraction.

Donkor et al⁹ found that 13% of the subjects injected with the Vazirani-Akinosi nerve block required an additional block injection. This failure of anaesthesia can be attributed to the fact that the technique is relatively blind with no precise bony landmarks⁵. Additionally since the target area is medial to the ramus of the mandible and the buccal nerve traverses the outer surface of the ramus, this technique fails to anaesthetise the buccal nerve.

As anaesthesia of lower half of the lip is a confirmatory indicator of success of anaesthetic technique, it was assessed separately for all the three techniques. Anaesthesia of lower half of the lip was not noted in 30% of patients in group C. Injecting too far medially and not approaching the pterygomandibular space could be the reason for the failure of Vazirani-Akinosi technique¹⁰. Therefore, this technique is less efficient when compared to the Gow-Gates and Inferior Alveolar Nerve techniques with respect to anaesthesia of lower lip². On comparison of extent of soft tissue anaesthesia Gow-Gates exhibited better results than the other two techniques.

A total of 5 grossly decayed molars were extracted without any pain in both group A and B while 2 out of 5 patients in group C experienced severe pain during extraction. 2 patients with periapical abscess in group A and one patient in group C experienced severe pain on application of the forceps, whereas one patient with the same in group B experienced mild pain. Various studies have quoted that failure of local anaesthesia is eight times more in patients with irreversible pulpitis¹¹. Therefore buccal nerve block, infiltrations and periodontal ligament (PDL) injections were given when necessary and the tooth was extracted.

All six patients who had periodontitis experienced pain during extraction inspite of the nerve block being given. In 20% of the patients in group A, the block was not effective in the first attempt and was repeated. This could be due to a technical error by the operator such as improper angulation of the syringe or false identification of the landmarks¹².

Mandibular foramen highly varies anatomically and can result in the failure of the block¹². Even though Vazirani-Akinosi technique anaesthetised all the possible soft tissues, 35% of the patients had moderate to severe pain during extraction in this study.

30% of IAN technique demonstrated positive aspiration in our study. A similar observation was noted in a study done by Nakkeeran KP et al⁴, where he stated that this could possibly be due to the fact that the inferior alveolar nerve lies in close proximity to the artery during its course.

In case of a positive aspiration, the syringe was discarded and the injection was repeated. Our study results are similar to a study conducted by Martinez-Gonzalez et al¹³ who reported a positive aspiration rate of 47% with inferior alveolar nerve block.

In this study we used 3.6ml of anaesthetic solution for each of the nerve blocks. Kohler et al¹⁴ demonstrated a higher success rate for extractions with the volume being increased to 3.6ml for the Gow-Gates technique (18% versus 82%). An adequate volume of local anaesthetic solution is necessary to bathe a sufficient length of the inferior alveolar nerve so that it can inhibit the transmission of pain signals temporarily¹⁰.

Malamed¹⁵ reported a 97% success rate for the Gow-Gates technique. Similarly in this study, Gow-Gates technique demonstrated a high success rate of 84%. Efficiency depends on depositing the local anaesthetic solution within 1mm of the nerve trunk. Success rate can be increased by using a higher landmark for insertion of the needle which is 1.5 to 2.0 cm above the mandibular occlusal plane⁸. Hematoma and transient facial nerve palsy are rare complications that occur with inferior alveolar nerve block and Gow-Gates technique¹⁶ whereas trismus is a common complication of all the three techniques.

None of these complications were seen in our study. Gow-Gates technique has pterygoid fovea region of the mandible as the target area for injection. Once the solution is deposited, it diffuses inferiorly, filling the pterygomandibular space.

Therefore all sensory branches of the mandibular nerve, including the nerve to mylohyoid get anaesthetised¹². It also has a high incidence of hematoma due to the close proximity of the maxillary artery and the pterygoid plexus; however, we did not notice this complication in our study. Since it is an open mouth technique it cannot be performed in patients with trismus.

Conclusion: Based on the results obtained, the onset of anaesthesia was same in all three techniques and only a slight clinically significant difference was noted with the pain at the injection site. However, Gow-Gates technique provided greater extent of soft tissue anaesthesia when compared to other two techniques; and the pain during extraction was minimal with the same. Hence, Gow-Gates technique demonstrated better efficiency when compared to the inferior alveolar or the Vazirani-Akinosi technique and therefore must be practiced frequently. Larger sample size would have been beneficial for a better comparison as the sample size in this study is small in number.

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