EFFICACY OF LOCAL ANESTHESIA WITHOUT VASOCONSTRICTOR USING GOW-GATES AND CLASSICAL INFERIOR ALVEOLAR NERVE BLOCK TECHNIQUES

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Abstract

Aim: This study aims to evaluate the efficacy of local anesthesia with and without vasoconstrictors using Gow-Gates and classical inferior alveolar nerve block techniques.

Materials and method: This study includes 4 groups with each group having 10 patients, Group I included administration of local anesthesia without vasoconstrictor by Gow-Gates technique, Group II included classical inferior alveolar nerve block without vasoconstrictor and Group III included administration of local anesthesia with vasoconstrictor using Gow-Gates technique and group IV included classical inferior alveolar nerve block with a vasoconstrictor.

The effectiveness of the techniques was evaluated by probing the regions innervated by the inferior alveolar, lingual, and buccal nerves, and also by assessing pain during injection, time of onset of lip anesthesia, complete lip anesthesia, and any associated complications.

Results: The mean time of onset for anesthesia for Gow Gates without vasoconstrictor was found to be 6mins 5 secs, Gow Gates with vasoconstrictor was 8 mins 20 secs, Classical IANB without vasoconstrictor 5mins 18 secs, and for Classical IANB with vasoconstrictor was 6mins 40secs.

Significant results were found between all the groups for the onset of anesthetic action, except between the Gow Gates technique without vasoconstrictor and Classical IANB technique wa ith vasoconstrictor.

Discussion: Since there is no significant difference between onset of time of anesthesia between Gow Gates technique without vasoconstrictor and classical IANB technique with vasoconstrictor, Gow Gates technique without vasoconstrictor shows to have similar efficiency to that of classical IANB technique with vasoconstrictor.

Conclusion: Since the result of any clinical studies involving anaesthetic techniques require subjective findings, its advantages become significant only after repetitive studies. Further studies should be done to establish that Gow Gates technique without vasoconstrictor shows better efficacy than Classical IANB technique.

Keywords: Gow Gates technique, Classical IANB, Anesthesia, Vasoconstrictor,innovation

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1. Introduction

Local anaesthesia is the most commonly employed technique of achieving pain control in dentistry.
Extraction of teeth, root canal treatment, minor surgical procedures and periodontal procedures mandatorily require the administration of a local anaesthetic agent to minimize patient pain and discomfort during treatment.(1,2)
Anaesthesia of structures innervated by the mandibular nerve is necessary to provide adequate pain control when performing dental and localized surgical procedures. There is considerable anatomical variation as the mandible generally consists of dense, thickened bone, making it difficult for externally deposited local anaesthetic to diffuse towards the inferior alveolar nerve (IAN) that lies within the mandible. Therefore, clinicians commonly attempt to anaesthetise the nerve, before it enters the mandibular canal via blockade anaesthesia. Considering that the peripheral extension of the mandibular nerve, after it leaves the cranial base, is not encased in bone for some distance, there are opportunities to administer blockade anesthesia at multiple levels. Although many techniques for mandibular blockade anesthesia are practiced, the direct inferior alveolar nerve block (IANB), the indirect IANB, the Akinosi closed-mouth technique, the Gow-Gates technique, and variations thereof are most commonly used. (3–6)
The inferior alveolar nerve block (IANB), was introduced by Jorgensen and Hayden in 1967, it is the most commonly employed technique for mandibular anesthesia.(7) This is an efficient as well as a safe technique to anaesthetize the mandible; however, it has some disadvantages as it depends on the existence and detection of anatomic landmarks Anatomy of the mandibular ramus and foramen can vary; hence, failure to perform the correct mandibular anesthesia is more frequent with IANB in comparison with the other techniques.(8)
In 1973, George Gow-Gates introduced a technique to block the mandibular nerve in which the solution was administered close to the neck of the mandibular condyle.(9,10) In this technique, the target site of anesthetic solution is proximal to the mandibular nerve innervations, and therefore, the inferior alveolar and its branches (incisive and mental), lingual, mylohyoid, auriculotemporal, and buccal nerves are anesthetized at once. Its success rate is greater than 95%, (11) which is much greater than that of classical IANB, also since it is a true mandibular nerve block, it anesthetizes the entire nerve in only one injection and does not require supplemental injections- unlike the classical IANB. Its lower positive aspiration rate is also 2%, unlike 10-15% of classical IANB, which is also an advantage. (12) . Our team has extensive knowledge and research experience that has translate into high quality publications (13–22))
It made us do multiple research in the field of dentistry.

2. Materials and Method

A double-blind randomized study was conducted, which included 40 patients who had given their informed consent to participate. Patients undergoing extractions in relation to mandibular teeth were divided into 4 groups by randomization trial. Group I included administration of local anesthesia without vasoconstrictor by Gow-Gates technique, Group II included classical inferior alveolar nerve block without vasoconstrictor and Group III included administration of local anesthesia with vasoconstrictor using Gow-Gates technique and group IV included classical inferior alveolar nerve block with a vasoconstrictor.
The inclusion criteria for the study included the following:
•clinically healthy patients,
•grossly decayed teeth undergoing extraction,
•carious tooth with pulpal involvement undergoing root canal treatment,
•periodontally compromised teeth undergoing extraction,
•interested patients.
Exclusion criteria for the study included:
•patients younger than 18 years of age,
•patients allergic to the local anesthetic agents,
•patients with systemic diseases,
•grossly decayed teeth with periapical lesions,
•periodontally compromised teeth with periapical lesions.

Technique:
Gow-Gates technique:
First, the tissue targeted for needle insertion was dried with sterile gauze. The extraoral and intraoral landmarks were located as follows: extraoral landmarks were the lower border of the tragus (intertragic notch) and the corner of the mouth, and intraoral landmarks with the height of injection established by placement of the needle tip just below the mesiopalatal cusp of the maxillary second molar.(23) The tip was moved to a point just distal to the molar. After completion of the localization of landmarks, the syringe was directed and the needle was gently inserted, and then slowly advanced until contact with the bone of the anterior condyle was made. The needle was withdrawn 1 mm when this bone contact was confirmed. If bone contact was not obtained, the needle was slightly withdrawn and redirected. Aspiration was then performed to avoid intravenous injection. (11,24)

IANB technique

First, to anaesthetize the inferior alveolar nerve, the tissue targeted for needle insertion was dried with sterile gauze. The intraoral landmarks were located and the needle was gently inserted. When contact was made with the bone, the needle was withdrawn 1 mm to prevent a subperiosteal injection. Then, aspiration was performed.(25,26)

Second, to anaesthetize the lingual nerve, the syringe was slowly withdrawn until approximately half its length remained within the tissue. Aspiration was again performed. If negative, a portion of the remaining solution was deposited to anaesthetize the lingual nerve. Third, to anaesthetize the long buccal nerve, the mucous membrane distal and buccal to the last molar was penetrated. The needle was slowly advanced until contact with the mucoperiosteum was made, and the anesthetic solution was gently deposited. The depth of penetration was usually only 1–2 mm. (27,28)

The preoperative pain was rated from zero to ten using the Visual Analog Scale. Local anesthesia was administered and time was noted from the time of needle insertion up to the time of onset of anesthesia. A supplemental Long buccal nerve block was given in the case of classical Inferior alveolar nerve block. A visual Analog Scale was also taken to rate the pain the on insertion of needle. The effectiveness of the techniques was evaluated by probing the regions innervated by the inferior alveolar, lingual, and buccal nerves, and also by assessing the time of onset of lip anaesthesia, complete lip anesthesia and any associated complications.

The block was considered a success if there were positive subjective and objective symptoms and the patient did not experience any pain during the procedure.

The block was considered a failure if the patient complained of pain during the procedure.

Statistical analysis was carried out for the time of onset of anesthesia between the four groups.

3. Result

Table 1: Gow Gates technique without vasoconstrictor

Pre-operative pain	**Buccal nerve block**	**Pulpal anaesthesia**	**Time**	**Pain during procedure**
9	no	yes	6m 2s	absent
6	no	yes	7m	present
5	no	yes	7m 40s	absent
4	no	yes	6m 50s	absent
5	no	yes	5m 55s	absent
8	no	yes	6m 55s	absent
9	no	yes	6m 45s	absent
5	yes	yes	6m 20s	absent

7	yes	yes	6m 40s	absent
9	no	yes	7m 55s	absent

Table 2: Gow Gates technique with vasoconstrictor.

Pre-operative pain	**Buccal nerve block**	**Pulpal anaesthesia**	**Time**	**Pain during procedure**
5	no	yes	7m 20s	absent
8	no	yes	8m 40s	absent
9	no	yes	8m 5s	absent
8	no	no	9m 4s	absent
4	no	yes	7m 40s	absent
9	no	yes	8m 55s	absent
8	no	yes	7m 30s	absent
5	no	yes	8m 45s	absent
5	no	yes	9m 25s	absent
2	no	yes	8m 45s	absent

Table 3: Classical Inferior alveolar nerve block without vasoconstrictor

Pre-operative pain	**Buccal nerve block**	**Pulpal anaesthesia**	**Time**	**Pain during procedure**
6	yes	yes	4m 2s	absent

5	yes	yes	5m 40s	present
6	no	no	6m 50s	absent
6	no	yes	5m	absent
7	yes	yes	5m 55s	absent
5	yes	no	6m 5s	absent
5	yes	yes	4m 5s	absent
2	yes	yes	5m 12s	absent
9	yes	yes	6m	absent
8	no	yes	4m 20s	absent

Table 4: Classical Inferior alveolar nerve block with vasoconstrictor.

Pre-operative pain	**Buccal nerve block**	**pulpal anaesthesia**	**Time**	**Pain during procedure**
5	yes	no	7m 4s	absent
5	yes	yes	6m	present
5	yes	yes	7m 20s	absent
8	yes	no	8m 40s	absent
4	yes	yes	7m 22s	absent
8	yes	yes	5m 5s	absent

9	yes	no	6m 30s	absent
7	no	yes	5m 20s	absent
2	yes	yes	6m 5s	absent
6	yes	yes	5m 55s	absent

Table 5: Mean of time of onset of the 4 groups.

	N	Mean	Std. Deviation
Gow Gates technique without Adrenaline	10	6mins 5secs	.61119
Gow Gates technique with Adrenaline	10	8mins 20 secs	.71237
Classical IANB technique without Adrenaline	10	5mins 18 secs	.88035
Classical IANB technique with Adrenaline	10	6mins 40 secs	1.05407

Table 6: Significance for time of onset between the groups.

Technique	Technique	Sig.	
Gow Gates without Adrenaline	Gow Gates with Adrenaline	.000	
	Classical IANB without Adrenaline	.004	

	Classical IANB with Adrenaline	.972	
Gow Gates with Adrenaline	Gow Gates without Adrenaline	.000	
	Classical IANB without Adrenaline	.000	
	Classical IANB with Adrenaline	.000	
Classical IANB without Adrenaline	Gow Gates without Adrenaline	.004	
	Gow Gates with Adrenaline	.000	
	Classical IANB with Adrenaline	.013	
Classical IANB with Adrenaline	Gow Gates without Adrenaline	.972	
	Gow Gates with Adrenaline	.000	
	Classical IANB without Adrenaline	.013	

The present study included 40 patients undergoing extraction or root canal treatment or pain management in the mandibular teeth. The patients were divided into four groups. The mean time of onset for anaesthesia for Gow Gates without vasoconstrictor was found to be 6 mins 5 secs, Gow Gates with vasoconstrictor was 8 mins 20 secs, Classical IANB without vasoconstrictor 5 mins 18 secs and for Classical IANB with vasoconstrictor was 6 mins 40 secs.

Significant results were found between all the groups for the onset of anesthetic action, except between Gow Gates technique without vasoconstrictor and Classical IANB technique with vasoconstrictor. Since there is no significant difference between onset of time of anesthesia between Gow Gates technique without vasoconstrictor and classical IANB technique with vasoconstrictor, Gow Gates technique without vasoconstrictor shows to have similar efficiency to

that of classical IANB technique with vasoconstrictor.

Additional supplemental buccal nerve block was given in 90% individuals with classical IANB with vasoconstrictor, 70% individuals with classical IANB without vasoconstrictor when compared to only 20% individuals with Gow Gates technique without vasoconstrictor. 30% individuals complained of pain during procedure in Classical IANB technique with vasoconstrictor, 20% individuals complained of pain during Classical IANB without vasoconstrictor, only 10% complained of pain during Gow Gates technique with vasoconstrictor, while Gow Gates technique without vasoconstrictor showed 100% success rate.

4. Discussion

The present study shows that Gow Gates technique without vasoconstrictor shows similar efficacy to that of Classical IANB technique with vasoconstrictor.

The Gow-Gates technique (92%–100%) has shown a higher success rate than the conventional inferior alveolar nerve technique (65%–86%) in most of the studies. (29–31)

Aggarwal V et al., conducted a randomized double blind study which included 25 patients receiving Gow Gates technique of Inferior alveolar nerve block, 24 patients receiving Vazirani-Akinosi technique for inferior alveolar nerve block, 26 patients receiving only buccal-plus-lingual infiltrations, and 22 patients (control) receiving conventional IANB anesthesia. They found Gow Gates technique more efficient with 52% success rate compared to 27% success rate in conventional IANB. (31)

Bernard Rolf et al., also found 82.5% success rate on Gow Gates technique when 3.6 ml of anaesthetic solution was injected. (32,33)

Cruz et al., compared the degree of patient acceptability between Gow Gates technique, Classical IANB technique and Vazirani-Akinosi technique and found Gow Gates technique to have a higher success rate while Vazirani- Akinosi technique showed better patient acceptability.(31,34)

However, Todorovic et al (35) found a higher success rate with the conventional inferior alveolar nerve block than the Gow-Gates block, whereas many studies found equivalent efficacy between Gow Gates and Classical IANB technique. (36,37)

Goldberg *et al*.(38) used 3.6 ml lidocaine for both techniques, while Hung *et al*.(39) used 2.7 ml for both groups

Abbas et al.,(40) also found Gow Gates technique to be equally effective as that of Classical IANB technique.

The Gow Gates technique in our study was shown to have a longer duration of anesthetic effect when compared to the Classical IANB technique. However Gow Gates claims that the onset of anesthesia is faster with his technique because the anesthetic solution tends to bathe the mandibular nerve and its branches within the confines of the interpterygoid facial pouch. While some studies claim that the onset of action is more rapid in the case of Classical IANB due to the closeness of the injection site to the surgical site. (12)

5. Conclusion

Since the result of any clinical studies involving anesthetic techniques requires subjective findings, their advantages become significant only after repetitive studies. Further studies should be done to establish that the Gow Gates technique without vasoconstrictor shows better efficacy than the Classical IANB technique.

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