

Comparison of Anesthetic Efficacy of IANB - Classical and Gow-Gates Technique during Surgical Removal of Impacted Mandibular Third Molar.

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ABSTRACT

Background: The most frequently used mandibular injection technique is inferior alveolar nerve (IANB) block for achieving local anesthesia for dental treatment. The IANB block does not always give success. The interruption of sensory transmission to its best, by depositing anesthetic solution at lingula has not been proved. Aim: To compare the degree of patient acceptability and clinical efficacy of IANB and GG techniques in patients undergoing surgical removal of impacted mandibular third molar under local anesthesia. **Methods:** The split-mouth design was conducted on 20 healthy and ambulatory individuals (10 male and 10 female) aged between 40 and 50 years undergoing surgical removal of bilateral symmetrical impacted mandibular third molar reporting. **Results:** VAS of IANB was 4.60 ± 1.82 and GG was 1.95 ± 1.64 with GG more comfortable and no difference in case of aspiration. Onset of Anesthesia was better in IANB than GG with no difference in duration of anesthesia in both groups. **Conclusion:** To conclude GG is considered better than IANB in Mandibular block anesthesia.

Keywords: Local Anesthesia; Mandibular Nerve Block; Inferior Alveolar Nerve; Gow-Gates.

INTRODUCTION

The foundation of successful dental patient management is Pain control. Dentists were responsible for the discovery of anesthesia. The two dentists, Horace Wells (1815–1848) with nitrous oxide in 1844, and William Thomas Green Morton (1819–1868) with ether in 1846 introduced anaesthesia.^[1]

Good injection technique is essential for consistent local anesthesia. In 1884 Carl Koller, the father of local anesthesia demonstrated the usefulness of the extract from cocaine leaves as a topical anesthetic for the eyes. William Halsted used cocaine in 1884 for the first nerve block (an inferior alveolar nerve block). Nils Lofgren introduced lidocaine in 1943(proprietary name xylocaine). Lidocaine is the most commonly chosen anesthetic today.^[2]

Maxillary anesthesia is mostly successful because maxillary teeth apexes are not surrounded by dens

bone. Because of higher density of cortical alveolar bone in mandibular teeth, the success rate in pulpal anesthesia is low and much more difficult.^[3]

The most frequently used mandibular injection technique is inferior alveolar nerve (IANB) block for achieving local anesthesia for dental treatment. The IANB block does not always give success. The failure of IANB represents a common clinical problem for the treatment of mandibular teeth. The reason attributed to the failure of the IANB includes greater variation in mandible anatomy and deeper soft tissue penetration.^[4] The interruption of sensory transmission to its best, by depositing anesthetic solution at lingula has not been proved even by introducing many modifications in recent years.^[5] Over the period various other nerve blocks were introduced to improve the success rate of anesthesia.

Gow-Gates in 1973 introduced a new Mandibular Block Technique (Gow Gates Technique GG) to provide analgesia in the mandible by using one position for inserting the needle and deposits an adequate volume and concentration of the anesthetic solution.^[6] GG blocks all oral sensory branches of the mandibular nerve. The latero-anterior surface of the condyle is the injection site of GG, just below the insertion of the lateral pterygoid muscle.^[7]

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GG is considered to be the best alternative for IANB, but the onset of anesthesia is slower in case of GG. The incidence of failure in GG is also higher until the administrator gains clinical experience with it.^[8]

Aim

To compare the degree of patient acceptability and clinical efficacy of IANB and GG techniques in patients undergoing surgical removal of impacted mandibular third molar under local anesthesia.

MATERIALS AND METHODS

The split-mouth design was conducted on 20 healthy and ambulatory individuals (10 male and 10 female) aged between 40 and 50 years with a mean age of 44.35 ±3.63 years undergoing surgical removal of bilateral symmetrical impacted mandibular third molar reporting to the Department of Dental Surgery and was approved by the ethical committee.

Patients suffering from trigeminal neuralgia were excluded from the study. Infection may alter the action of local anesthetic drug hence those patients were excluded from the study. No premedication was administered as this may interfere with the level of consciousness that could alter the subjective symptoms.

Bilateral symmetrical impacted lower third molars were removed for each patient with a 2 weeks interval between the surgeries. The technique for removal of the tooth on both sides was same. The surgical procedures were performed by the same surgeon. GG or IANB techniques were used for anesthetizing the jaw before surgery. Anyone of these two methods was selected randomly and the other for the left side.

A standard local anesthetic agent 2ml of 2% lignocaine hydrochloride (Lignox) with 1:80,000 adrenaline was used in all the cases. Conventional luer lock syringes of 26 gauge and 38 mm needles were used.

All the injections were administered by another surgeon who was blinded to the study. The surgeon who did the procedures was not aware of the anesthetic technique used. The long buccal nerve was anesthetized separately in IANB group to obtain buccal mucosa anesthesia. In the GG group, the same was done when the long buccal nerve was not anesthetized.

The patient was assessed for the following: pain during injection, positive aspiration frequency, onset and duration of anesthesia and nerves anesthetized.

Before injecting the anesthetic solution rotate the barrel of the syringe twice about 45o an aspiration test was conducted to avoid false negative aspiration. Pain during injection was recorded

using visual analog scale (VAS) on a ruler marked from zero to ten.

The patient was questioned every 30 seconds for the onset of anesthesia. The onset of anesthesia was determined by subjective and objective symptoms. Subjective symptoms include numbness of lower lip, half of tongue and cheek on the side of injection. Objective signs include demonstrating anesthesia between first and second premolars for inferior alveolar nerve, the buccal gingiva in the third molar region for the long buccal nerve and the lingual gingiva for lingual nerve. 10 minutes after deposition of anesthetic solution absence of subjective symptoms and objective signs, the block was considered as a failure, and the whole procedure was repeated. In case of GG technique when there was the failure of only long buccal nerve anesthesia, along buccal nerve injection was given at the distobuccal aspect of the third molar rather than repeating the whole procedure.

Results were statistically analysed by Independent Sample t test and Chi square test. A ‘P’ value of less than 0.05 was considered for statistically significant.

RESULTS

Mean pain during injection of IANB technique was 4.60±1.82 onVAS and during GG technique was 1.95±1.64on VAS. Higher mean pain during injection was recorded in IANB compared to GG technique and difference between them was found to be statistically significant. Positive aspiration was obtained in 15% and 5% of the cases in IANB and GG groups respectively. No significant association was observed between aspiration and the groups.

Table 1: Comparison of Variables between 2 groups.

Variables	Group	Mean	Std. Deviation	t value	P value
Pain (VAS)	Classical	4.60	1.82	4.84	<0.001
	Gowgates	1.95	1.64		
Onset of Anesthesia	Classical	134.50	41.45	-16.65	<0.001
	Gowgates	409.25	61.01		
Duration of Anesthesia	Classical	186.00	59.48	-2.21	0.033
	Gowgates	231.50	70.06		

In the IANB group, the onset of anesthesia was in the range from 85 to 210 seconds with a mean average of 134.5±41.41 seconds whereas, in the GG group it was in the range from 300 to 500 seconds with a mean range of 409.25±61.01seconds. The Higher mean onset of anesthesia was recorded in GG group compared to IANB

group, and the difference between them was found to be statistically significant. The duration of anesthesia in IANB group found to be in the range of 115 to 340 minutes with the mean average of 186 ± 59.48 minutes whereas, in GG group it was found to be in the range of 130 to 370 minutes with the mean average of 231.5 ± 70.06 minutes. Higher mean duration of anesthesia was recorded in the GG group compared to IANB group but the difference between them was not statistically significant. In our study none of the patient in both the IANB and GG group experienced untoward reaction.

DISCUSSION

The study evaluated the success rate of GG technique in comparison to IANB. Pain on injection could be one of the determining factors in their selection. Higher mean pain during injection was recorded in IANB than GG in our study. Similar findings shown in studies by Nanjappa et al.^[9] Kaufman in his study proved the inferior alveolar injection was graded to be the most painful with highest rates of discomfort.^[10] But Yesilyurt in his study the IANB technique resulted in significantly lower pain scores using wand technique.^[11]

GG block produces less discomfort both during the injection. In common with all other intra-oral mandibular block techniques, the needle first penetrates the oral mucosa and the underlying sheet of buccinator muscle. After this, the needlepoint traverses a corridor of fat between the medial head of temporalis and the medial pterygoid muscle. Neither muscle is impaled by the needle at any time, and this is probably the explanation for the reduced level of discomfort.^[7] Furthermore, directing the needle away from the lingula avoids compromising the medial pterygoid muscle, a common cause of trismus.

The aspiration test proved to be negative in most of the cases, and no significant association was observed between aspiration and groups. Percentage of aspiration in IANB group was 15% and in GG group was 5%. FanyuanYu in his study proved that G-G had a lower risk of positive aspiration than IANB.^[13]

A comparison of the microanatomy of the injection sites at the condyle and the lingula indicates the relatively avascular site at the latero-anterior surface of the condyle. The blood vessels are small, smaller than the lumen of a 25-gauge needle, in contrast to the injection site at the lingula, where blood vessels, arteries, and veins are large and more numerous.^[8] With the traditional inferior alveolar block, the anesthetic solution is deposited within the neurovascular bundle, hence high positive aspirations. The mandibular nerve is closely related to artery and vein. In GG technique directing the needle away from the nerve trunk assists in avoiding vascular penetration. Furthermore, the target zone for the placement of the solution is relatively avascular and reduces the incidence of positive aspirations.^[7] IANB technique which aims the needle toward the mandibular foramen is accompanied by risks such as vascular or neural injury, intravascular injection, and muscular injury.

In our study about onset of anesthesia GG technique and IANB, the difference was statistically significant. FanyuanYu et al. in his study, GG manifested a longer onset time than IANB.^[13] Nanjappa et al. showed similar results

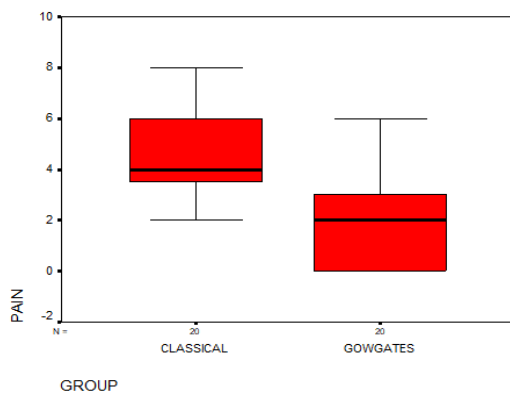


Figure 1: Comparison of Pain between 2 groups

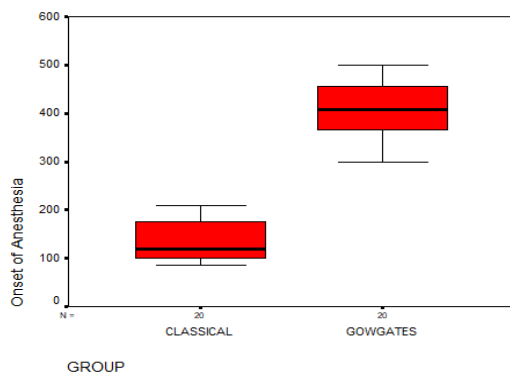


Figure 2: Comparison of Onset of Anesthesia between 2 groups

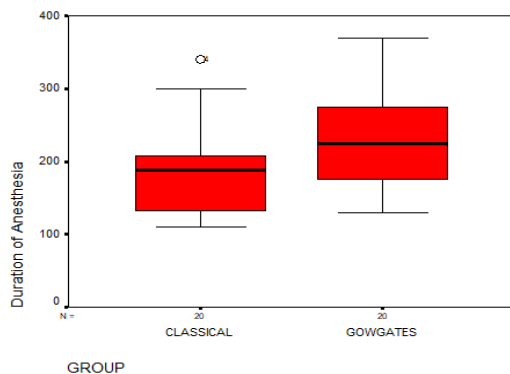


Figure 3: Comparison of Duration of Anesthesia between 2 groups

with GG showing the prolonged onset of anaesthesia.⁹ Abbas et al. in his study demonstrated success rates and onset time are not significantly different in IANB and GG techniques.^[14] Priyanka et al. in their study concluded that both the Gow-Gate technique and the IANB technique are equally effective.^[15] IANB technique with 4% articaine exhibited faster onset and also had the longest duration of pulpal anesthesia when compared with all solutions.^[16]

Depositing the solution into a relatively avascular region, one of loose fatty areolar tissue, is readily distensible, minimizes the elevation in interstitial pressure, and reduces the rate of uptake into the circulation. It is reasonable to assume that the physiological components of the latero-anterior surface of the condyle (not the medial side) are more favorable, in pharmacological properties of anesthetic solutions, to diffusion than those at the lingula.^[12]

The IANB landmarks are unreliable for fixing the depth and position of the mandibular foramen, that diffusion cannot be predetermined accurately, and that depositing the solution in a desirable position may not provide even partial anesthesia of the inferior alveolar nerve.⁵

In our study none of the patient both in classical IANB and GG group experienced untoward reaction.

CONCLUSION

In our study if onset of anaesthesia is not taken into consideration GG technique is found to be more reliable, painless, beneficial, and have more success rate than the classical IANB group technique.

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