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FAILURE OF INFERIOR ALVEOLAR NERVE BLOCK (IANB) AND TECHNIQUES TO AVOID IT.

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ABSTRACT
Achieving proper anesthesia is imperative to performing most dental procedures. The most commonly used nerve block in mandibular dental procedures: The Inferior alveolar nerve block sometimes fail even when performed by the most experienced clinician. This paper is a review on various studies done on Inferior alveolar nerve block and its alternatives. The reasons for failure, patient compliance, effectiveness during the procedure and complications are to be kept in mind while looking for its newer alternatives. There is no single recipe for all the cases. Each case requires a tailored approach in the best interests of the patient.

KEYWORDS: Local anesthesia, IANB, Nerve Block, Failure, Mandible.

INTRODUCTION
Inferior alveolar nerve block is the most frequently used technique for anaesthetization of the hemi mandible and perhaps the most important injection technique in dentistry. It is routinely used in everyday dental and oral surgical procedures and, when combined with infiltration of the lingual and long buccal nerves, it provides adequate anaesthesia of a wide anatomical area. This includes all ipsilateral mandibular teeth and gingivae, body and inferior ramus of the mandible and anterior two-thirds of the tongue and floor of mouth. Although, even when done properly and by an experiences clinician, it has a failure rate of 15-20%.[1]

AIM
The aim of this paper is to discuss the reasons for failure of Inferior Alveolar Nerve Block and to discuss the alternatives of this technique.

Conventional IANB
This technique is the most routinely used technique and has been discussed over the decades amongst researchers and clinicians around the world. The nerve is approached from the opposite side of the mouth by angling the syringe from the premolars on the opposite side. The point of insertion is 5mm along an imaginary line bisecting the finger nail with finger resting on deepest point of ascending ramus. Tissues are stretched and become taut for atraumatic insertion of needle. The penetration depth is 20-25 mm until bone is hit, withdraw, aspirate, if negative- inject.[1] Figure 1 and 2 shows the anatomical landmarks where the injection is targeted.[2]

Figure 1

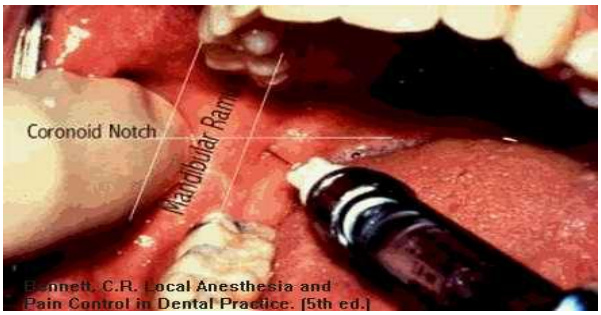

Figure 2

Failure of IANB

Several reasons have been attributed to failure of the IANB.

- **Anxiety**

Studies have shown the patients who are more anxious prior to the procedure; experience a higher amount of pain.[3] Patient complains of pain even when the anesthesia is adequate. Anxiety has shown to lower down the pain threshold.[2]

- **Accessory innervations**

The mandibular hard tissue and soft tissue is supplied by a plexus of nerves. This plexus, may allow sensation even if primary inferior alveolar nerve is blocked. In 10-20% of the cases, Mylohyoid nerve provides accessory innervation to mandibular molars. Injections given below mylohyoid have no effect on lateral incisors, canines and premolars. Molars are affected in 21% cases.[4] To solve this problem of Accessory innervations, Gow-Gates technique is used. It has a success rate of 92-100%.[5]

- **Anesthetic solution**

Cohen et al. showed that 3% mepivacaine is as effective as 2% lidocaine with 1:100 000 epinepthrine in achieving pulpal anaesthesia with IANB.[6] Hinkley et al. compared 4% prilocaine and 2% mepivacaine to 2% lidocaine. No significant difference was observed.[7]

There have been introduction of many new formulations but the failure of the IANB remains to be unchanged.

- **Volume of anesthetic solution**

Franz and Perry attributed that differential rates of blocking among myelinated axons are attributable to difference in critical lengths of axons that must be exposed to blocking concentration than to difference in minimum concentration necessary to block axons of different sizes.[8] To induce blockade of a whole nerve, it is necessary to apply the anaesthetic agent along a distance of no less than 3 inter-nodal lengths of largest fibers. The longest inter-nodal span of inferior dental nerve is 1.8mm.[9] So, atleast 6 mm of the nerve must be exposed to induce the block. To induce a satisfactory block, a minimum of 2.0 mL of solution must be deposited.[2] However, studies show 1.0 mL as the effective volume below which consistent success cannot be expected.[9]

- **Bifid mandibular canal**

Studies have shown that a bifid mandibular canal occurs at a rate of 0.35%. (10) (Figure 3) This can lead to missing one of the canals which may actually contain the nerve leading to inadequate or no anesthesia. In such cases, it is advised to deposit some additional solution inferior to the normal anatomical landmark.

Figure 3 - Bifid canal at white arrow

- **Inflammation and other related conditions in the trunk**

Pulpal inflammation and abscess is a major problem for endodontists when introducing anesthesia.[11] Studies have shown changes in the impulse generation of nerve fibres in presence of inflammation in rabbits. Some studies also suggest changes in peripheral sensory fibers in presence of inflammation.[12,13] However, a question arises about how can an inflamed pulp affect the entire conduction of the nerve's sensory fibers? To answer this, Wallace said that once the tissue is inflamed, resting membrane potential of all the nerves in the tissue is inflamed affected the entire neuron cell membrane.[11]

Techniques to avoid failure of IANB

There are some well known techniques to avoid the failure of IANB. However, no technique is 100% guaranteed. Some techniques serve as alternatives and some are useful when used along with IANB. Here are some of the techniques and their advantages.

1. Incisive nerve block

Provides pulpal and hard tissue anaesthesia without lingual anaesthesia; useful in cases with bilateral IANBs.[14]

2. Gow-Gates Mandibular Nerve Block

True mandibular block, provides anaesthesia to entire distribution of nerves. Nerves anaesthetized are Inferior alveolar, Mental, Incisive, Lingual, Mylohyoid, Auriculotemporal, Buccal nerves (in 75% patients). It has a high success rate and resolves the problem of accessory innervations.[5] Figure 4 shows the target area for the block.

Figure 4 - Target area for Gow-Gates

3. Vazirani Akinosi Mandibular Nerve Block

The closed mouth approach to mandibular anesthesia. It has a decreased risk of positive aspiration, useful in cases of trismus, provides successful anaesthesia in bifid alveolar nerve and bifid alveolar canals.[15] Figure 5 shows the target site for the block.

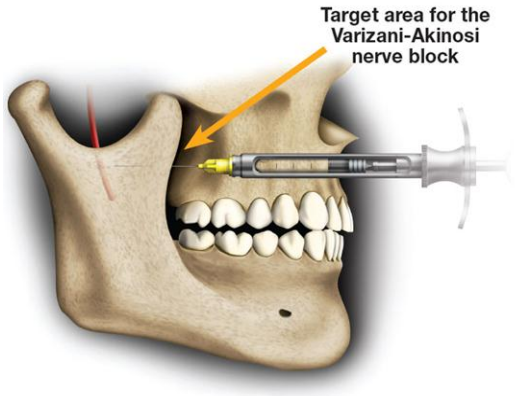

Figure 5

4. Modified Indirect IANB Technique by Nooh et al (2010)

This technique is the youngest and authors claim to have gained the best results from this technique. From 5000 blocks performed, the failure rate and positive aspiration was only 1% and 1.7% respectively. In this technique, the needle was inserted from the opposite premolar to touch antero-medial aspect of the ramus 1.5 cm above occlusal level. The needle was redirected by moving the syringe to the same side of injection above occlusal level. Needle was advanced in contact with bone, about 30-34 mm penetration and then solution was released after checking for aspiration.[16] Figure 6 shows the technique as done by the authors.

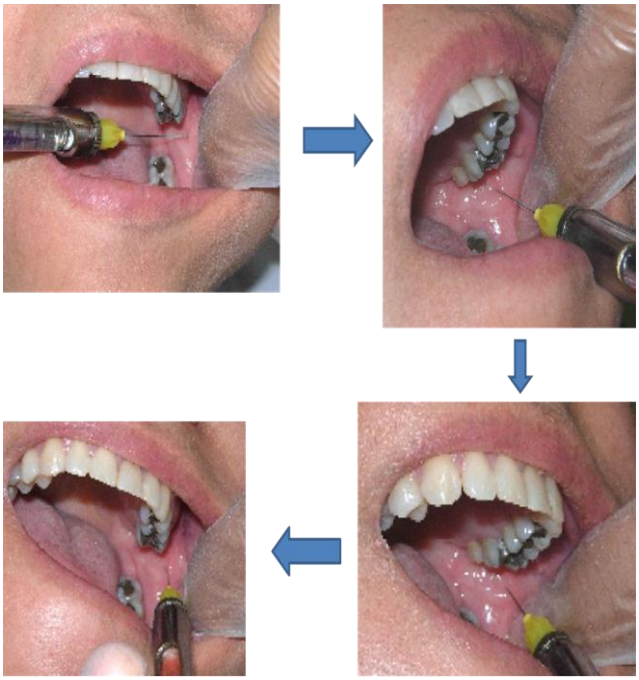

Figure 6

5. Periodontal Ligament Injection

Also known as *Intra ligamentary injection*. It regained popularity in early 1980s because of repeated failure of IANB. Technique was introduced in textbooks dating from 1912 to 1923. The advantage is that minimal dose is required. It can treat cases in which bilateral IANB are required, has rapid onset and is suitable in cases where bilateral IANB is required. This block is very well tolerated by pediatric patients.[17]

6. Intraosseous Injection

This technique involves deposition of local anaesthetic into inter proximal bone between two teeth. Surgical preparation is required by creating a hole for depositing the solution with a bur. There is lack of lip and tongue anaesthesia, is atraumatic, has immediate onset of action and 0% positive aspiration.[18]

CONCLUSION

Local anesthesia is imperative for smooth and successful completion of many routine dental and surgical procedures. Inferior alveolar nerve block remains to be the primary choice for many such procedures. There is significant failure rate with this technique. The commonest reasons can be summarized into anxiety, anatomical variations, accessory innervations, volume of the solution and inflammation of tissues. The different formulations of the anaesthetic have not yet shown any promising results. Various techniques have their own merits and demerits. The clinician must choose the most appropriate technique in the best interests of the patient while performing the nerve block.

REFERENCES

1. Malamed SF. Handbook of local anesthesia: Elsevier Health Sciences, 2014.
2. Monheim LM, Bennett CR. Monheim's local anesthesia and pain control in dental practice: CV Mosby, 1984.
3. Bronzo A, Powers G. Relationship of anxiety with pain threshold. The Journal of psychology. 1967; 66(2): 181-3.
4. Sillanpää M, Vuori V, Lehtinen R. The mylohyoid nerve and mandibular anesthesia. International journal of oral and maxillofacial surgery. 1988; 17(3): 206-7.
5. Gow-Gates G, Watson JE. Gow-Gates mandibular block--applied anatomy and histology. Anesthesia progress. 1989; 36(4-5): 193.
6. Cohen HP, Cha BY, Spångberg LS. Endodontic anesthesia in mandibular molars: a clinical study. Journal of Endodontics. 1993; 19(7): 370-3.
7. Hinkley SA, Reader A, Beck M, Meyers WJ. An evaluation of 4% prilocaine with 1: 200,000 epinephrine and 2% mepivacaine with 1: 20,000 levonordefrin compared with 2% lidocaine with 1: 100,000 epinephrine for inferior alveolar nerve block. Anesthesia progress. 1991; 38(3): 84.
8. Franz DN, Perry RS. Mechanisms for differential block among single myelinated and non-myelinated axons by procaine. The Journal of physiology. 1974; 236(1): 193.
9. Rood J. Some anatomical and physiological causes of failure to achieve mandibular analgesia. British Journal of Oral Surgery. 1977; 15(1): 75-82.
10. Sanchis J, Penarrocha M, Soler F. Bifid mandibular canal. Journal of oral and maxillofacial surgery. 2003; 61(4): 422-4.
11. Wallace JA, Michanowicz AE, Mundell RD, Wilson EG. A pilot study of the clinical problem of regionally anesthetizing the pulp of an acutely inflamed mandibular molar. Oral Surgery, Oral Medicine, Oral Pathology. 1985; 59(5): 517-21.
12. Najjar TA. Why can't you achieve adequate regional anesthesia in the presence of infection? Oral Surgery, Oral Medicine, Oral Pathology. 1977; 44(1): 7-13.
13. Strichartz G. Molecular mechanisms of nerve block by local anesthetics. Anesthesiology. 1976; 45(4): 421-41.
14. Nist RA, Reader A, Beck M, Meyers WJ. An evaluation of the incisive nerve block and combination inferior alveolar and incisive nerve blocks in mandibular anesthesia. Journal of endodontics. 1992; 18(9): 455-9.
15. Haas DA. Alternative mandibular nerve block techniques: a review of the Gow-Gates and Akinosi-Vazirani closed-mouth mandibular nerve block techniques. The Journal of the American Dental Association. 2011; 142: 8S-12S.
16. Nooh N, Abdullah WA. INCIDENCE OF COMPLICATIONS OF INFERIOR ALVEOLAR NERVE BLOCK INJECTION. Journal of Medicine & Biomedical Sciences. 2010; (2).
17. Childers M, Reader A, Nist R, Beck M, Meyers WJ. Anesthetic efficacy of the periodontal ligament injection after an inferior alveolar nerve block. Journal of Endodontics. 1996; 22(6): 317-20.
18. Dunbar D, Reader A, Nist R, Beck M, Meyers WJ. Anesthetic efficacy of the intraosseous injection after an inferior alveolar nerve block. Journal of Endodontics. 1996; 22(9): 481-6.