

# Failed Inferior alveolar nerve Blocks : Incidence, Causes & Management



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### Introduction

Most dental procedures are known to cause extreme pain and discomfort, and thereby result in high levels of apprehension and anxiety. As local anesthetics have the potency to block central nociceptive input, achieving proper anesthesia is imperative to perform such procedures with ease and efficiency. Although several techniques have been developed to effectively secure local/regional anesthesia, the conventional or classic inferior alveolar nerve block is the most commonly employed technique in dental practice owing to few inherent advantages. They include its widespread ability to anesthetize the lower jaw with a single prick and its simplicity and ease in execution.

In certain cases, however, this block can fail to produce the desired result even in the most experienced of hands. The documented clinical failure rate ranges between 15 and 20 percent. The reasons of course could be many. Therefore, we discuss the various possibilities leading to such failure and suggest solutions to overcome such a problem. In addition, a protocol in handling a failed IAN block is recommended.

### Why inferior alveolar nerve block fails often?

1. Anatomical variations - Accessory nerve supply (Mylohyoid nerve, Cervical cutaneous nerve C1, C2, Auriculotemporal nerve), variable course of nerve, variation in foramen position, bifid alveolar nerve or bifid mandibular canal.
2. Pathological - trismus, infection, inflammation, previous surgery;
3. Pharmacological - chronic alcohol abuse, chronic narcotic drug abuse;

4. Psychological - fear, anxiety, apprehension;

5. Improper technique - this is the most common reason for failure of the conventional inferior alveolar nerve block. We emphasize the three most commonly occurring problems with this technique.

**Inadequate mouth opening:** The target area for this block is the mandibular sulcus, which is at the level of the coronoid notch and above the mandibular foramen.<sup>3</sup> When the mouth opening is not adequate, the inferior alveolar nerve, which descends from above, is relaxed and away from the medial wall of the ramus. Consequently, it is at a distance from the target area, which leads to inadequate anesthesia. When the mouth opening is adequate, the nerve is flush against the medial wall of the ramus and at the target area.<sup>3</sup> Hence, the patient reports experiencing almost immediate onset of anesthesia. This is why the block does not work in cases of trismus and the closed-mouth block needs to be administered.

**Improper needle placement:** A common mistake is to insert the needle too far forward or backward of the target area.<sup>2</sup> Clinicians need to insert the needle just medial to the pterygomandibular raphe such that it approaches from the opposite side of the premolar region and bisects the thumbnail (or fingernail) placed at the deepest portion of the coronoid notch.<sup>1</sup> The needle is inserted to a depth of 20 to 25 millimeters.<sup>1</sup>

**Haste:** Malamed<sup>1</sup> recommends waiting three to five minutes after the injection prior to commencement of the procedure. We believe these minutes can be used to build rapport with the patient and make him or her feel at ease.



### What to Do If the Conventional Block Fails?

Repeat the block. If the conventional block fails, most general dental practitioners tend to repeat the block. Although this is effective in a few cases, repeated injections in the same area can lead to post-injection pain and even trismus.<sup>1</sup>

**Closed-Mouth Block (Vazirani/Akinosi Block):** This technique is most useful when the patient has trismus.<sup>4, 5</sup> The patient has the mouth closed and the syringe, fitted with a 35 mm needle, is advanced parallel to the maxillary occlusal plane at the level of the maxillary muco-gingival junction. The needle is advanced until the hub is level with the distal surface of the maxillary second molar, by which stage it will have penetrated the mucosa at a higher level than with the direct approach to the nerve. At this point the solution is deposited. This technique does not block the buccal nerve in some cases, so a separate buccal nerve block may be required to achieve anesthesia of the tissues buccal to the mandibular molars.<sup>1</sup> A small chance exists of over-inserting the needle and injuring the pterygoid venous plexus as there is no bony landmark available. However, the closed-mouth block is a reasonably safe technique that many practitioners perform routinely to achieve mandibular anesthesia.<sup>2</sup>

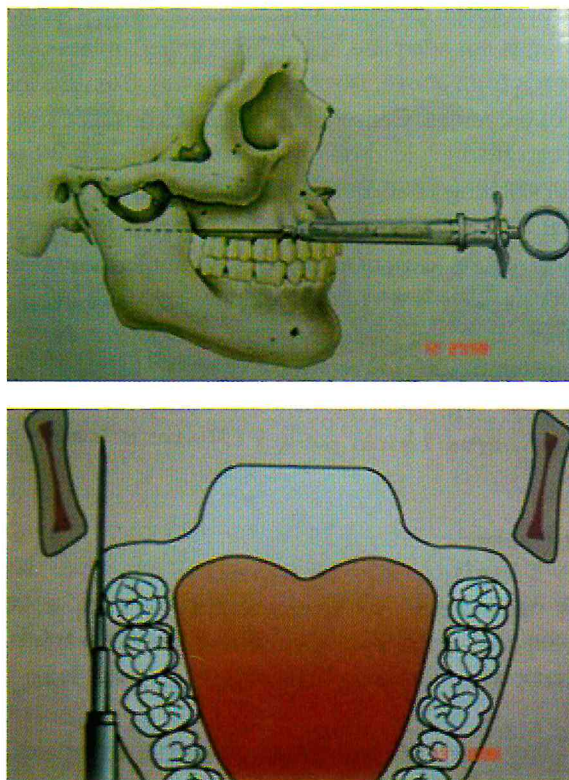


Fig. 1a and 1b depict the position of the needle during an Akinosi 'high' block of the inferior alveolar nerve.

**Gow-Gates Block :** Though technically more difficult than the conventional IANB or the VAB, it has a higher success rate.<sup>1</sup> This truly is a mandibular block, because it blocks almost all the branches of the mandibular division of the trigeminal nerve. With the patient's mouth wide open, the dentist imagines a line drawn from the ipsilateral angle of the mouth to the intertragic notch. The dentist introduces the needle across the contralateral mandibular canine and directs it across the mesiopalatal cusp of the ipsilateral upper second molar; the needle is advanced until contact with the condylar head (below the lateral pterygoid insertion) is made.<sup>6</sup> The dentist withdraws the needle slightly and, after aspirating, deposits a full cartridge of anesthetic. The patient should keep the mouth open for a few minutes until experiencing signs of inferior alveolar anesthesia.

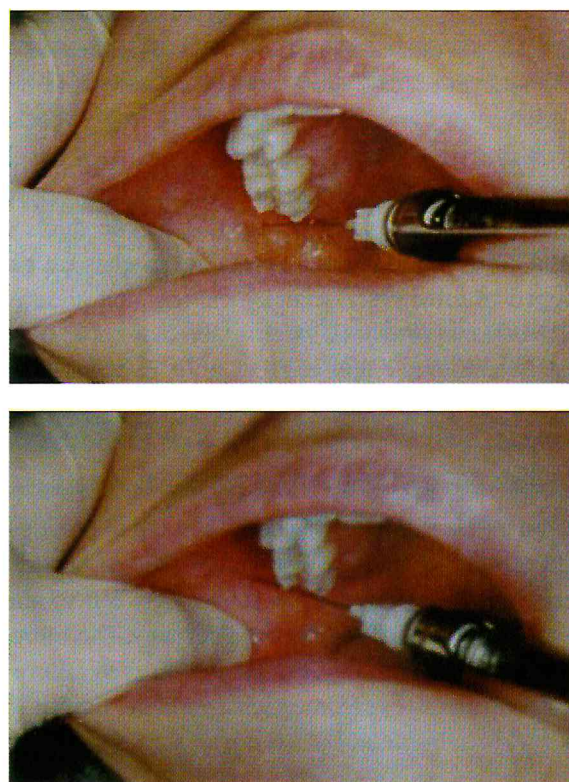


Fig.2a and 2b show the position of the needle during a Gow-Gates 'high' block of the inferior alveolar nerve.

**Intraligamentary Injection :** The intra-ligamentary injection can be used as a primary or secondary technique. It has limitations, such as short duration, but can be used to overcome a failed alveolar nerve block.<sup>2</sup> Of note, the intra-ligamentary injection technique is quite effective when a standard 27-gauge needle is used. Here, the needle is



inserted at the mesiobuccal aspect of the root and advances it until maximum penetration is achieved. The needle does not penetrate deeply into the periodontal ligament, but is wedged at the crest of the alveolar ridge, and keeping the bevel toward the root helps achieve better penetration.

**Intrapulpal Injection :** This technique can be most useful in endodontics. This injection, in particular, achieves anesthesia as a result of pressure, and not as a result of the local anesthetic solution. After locating a small access cavity into the pulp, using a needle that fits snugly into it, a small amount (0.1 mL) of anesthetic is injected under pressure. The patient will experience some transient discomfort during the injection, but onset of anesthesia is rapid. Additionally, the clinician can bathe the pulp, if exposed, in a small amount of local anesthetic for about one minute before introducing the needle as far apically as possible into the pulp<sup>2</sup>. This technique is a vital adjunct when the conventional block fails.

**Intraosseous Injection :** This injection can be performed using conventional or specialized equipment. The site of injection is the interradicular bone. The region to perforate is within the attached gingiva about 2 mm below the gingival margin of the adjacent teeth in the vertical plane, bisecting the interdental papilla. Although aspects of intraosseous anesthesia (such as increased risk of postoperative pain, discomfort and infection) preclude its use as a primary technique, it may be a useful adjunct to a failed inferior alveolar nerve block.

**Infiltration anesthesia :** Buccal infiltration anesthesia in the mandible can be effective in some areas (incisor region). Indeed, in children, this may be the preferred technique when treating the deciduous dentition.

**Mental and incisive nerve block :** When treating the lower premolar and anterior teeth, a mental and incisive nerve block may overcome a failed inferior alveolar nerve block.

**'Blunderbuss' technique :** This can be used for patients who had experienced failed anesthesia in the past. The underlying principle behind this is that, it is more difficult to gain patients' trust if they had been hurt in the past. The blunderbuss approach is to use IANB and buccal infiltration from the onset with the possible addition of a second IANB higher up the mandibular ramus.<sup>2</sup>

Other anesthetic techniques are also available, such as intraseptal injection and extraoral techniques, but these are of limited clinical value and are not discussed here.

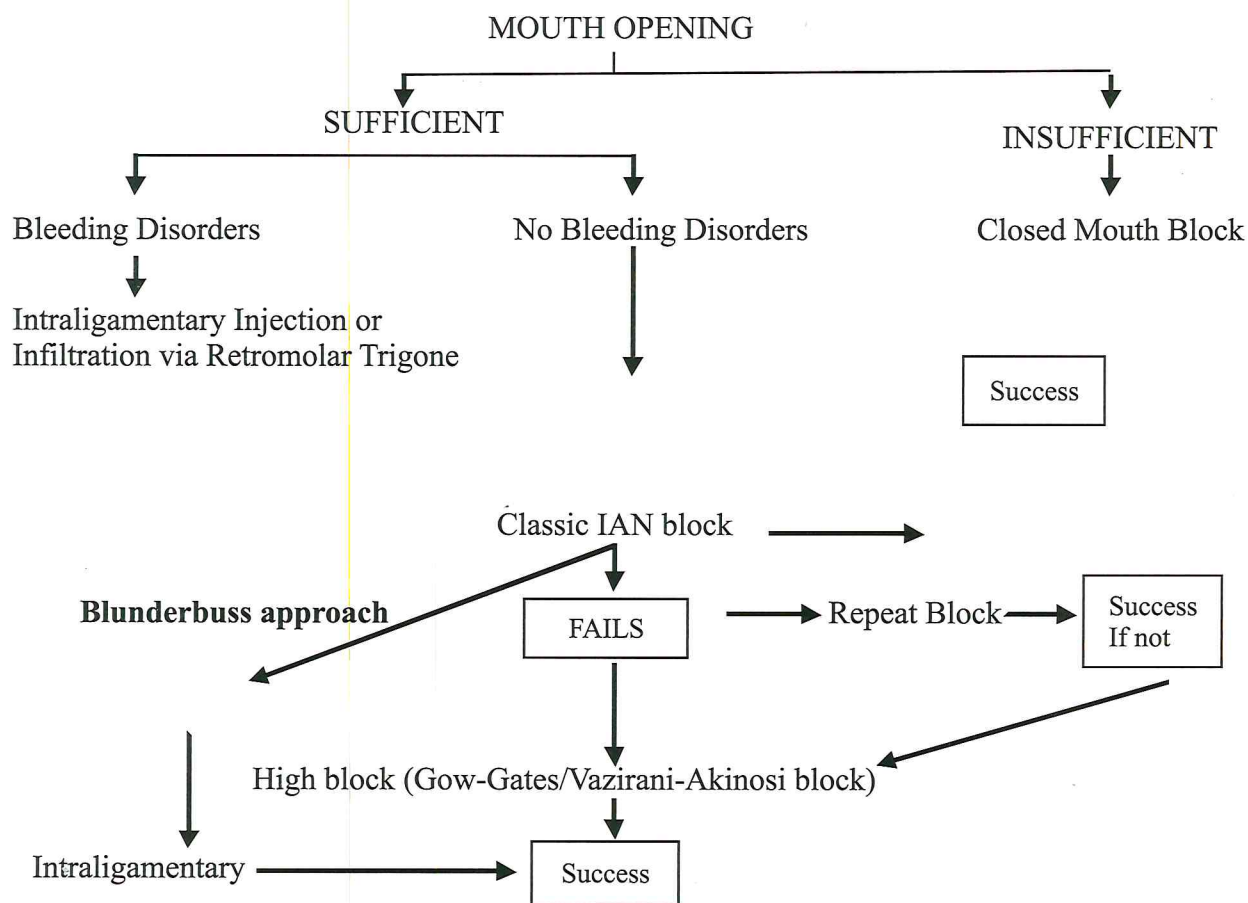
**Factors that help predict the degree of success in blocking the Inferior Alveolar Nerve, as recognized by practitioners:**

1. Difficulty experienced in locating anatomical landmarks especially the pterygomandibular raphe.
2. Inability experienced in finding a bony landmark with the needle.
3. Inability experienced in directing the needle satisfactorily due to tough tissue in the pterygomandibular space.
4. Awkward tongue: Either excessively large or due to lifting posteriorly. Some patients seem unable to allow the tongue to rest passively.
5. Difficult anatomy where posterior teeth have been lost and alveolar resorption has been excessive.
6. Needle curved when withdrawn. This is usually a sign that the dentist has struggled to manipulate the needle within the tissues.

**Table 1: Accessory nerve supply to the lower jaw and its management**

Main supply	Accessory supply	Accessory supply countered by:
Inferior alveolar nerve	Long buccal nerve	Long buccal block/buccal infiltration
Inferior alveolar nerve	Lingual nerve	Lingual block/lingual infiltration
Inferior alveolar nerve	Mylohyoid nerve	'High' block/lingual infiltration
Inferior alveolar nerve	Auriculotemporal nerve	'High' block
Inferior alveolar nerve	Upper cervical nerves	Buccal & lingual infiltrations

In the experience and wisdom of the author, every practitioner, as a rule, must devise an all-inclusive, clinically acceptable protocol, based on sound anatomical knowledge and mastery over other techniques.



**Figure 3: Suggested protocol for achieving local anesthesia in the mandible**

**In summary**, it is in the practitioner's interest to understand and master alternative techniques for achieving local anesthesia more effectively, so that a wide variety of options is available. But this should minimize if not prevent failure. However, knowledge of regional anatomy is above all else. Furthermore, mastery over various techniques and, for that reason, increased versatility in application, would maximize success in the dental office. This, consequently, would enable clinicians deliver patient-oriented treatment more comfortably and efficiently.

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