

Clinical Anatomy of Inferior Alveolar Nerve Block

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Abstract: *The inferior alveolar nerve block is the most common type of nerve block used for dental procedures. Knowledge of mouth and inferior alveolar nerve anatomy is required to perform the procedure. It plays a key role in the field of dentistry. If not properly administered, it may lead to adverse effects.*

Keywords: nerve block, inferior alveolar nerve

1. Introduction

Inferior alveolar nerve anaesthesia (also known as the inferior alveolar nerve block or IANB) is a technique for dental anaesthesia, used to cause anaesthetise the areas of the face innervated by the inferior alveolar nerve; namely, the lower lip and the teeth and gingiva of the mandible. This procedure attempts to anaesthetise the inferior alveolar nerve prior to it entering the mandibular foramen. Inferior alveolar nerve is the larger terminal branch of the posterior division of the mandible nerve, which is the largest of the three divisions the trigeminal nerve. It runs vertically downwards, lateral to the medial pterygoid and to the sphenomandibular ligament. It enters the mandibular canal. The inferior alveolar nerve enters the mandibular foramen in the ramus of the mandible to occupy the inferior alveolar canal in the body of the mandible. It is accompanied by the inferior alveolar artery. [1]

2. Inferior Alveolar Nerve-A Nerve Block

The following structures are anaesthetized by a nerve block of the intraoral inferior alveolar nerve

- The body of the mandible, the lower portion of the ramus.
- All the mandibular teeth.
- The floor of the mouth.
- The anterior two thirds of the tongue.
- Gingivae on the lingual and labial surface of the mandible.
- Mucosa and skin of the lower lip and the chin.

An inferior alveolar nerve block is required to work in the following areas of the mouth:

- Mandibular teeth to the midline.
- The anterior two thirds of the tongue.
- The floor of the oral cavity.[2]

Understanding the underlying anatomy of the pterygomandibular space helps increase the effectiveness of inferior alveolar nerve blocks.[3]

3. Injection Techniques

There are a numerous techniques that are used to achieve inferior alveolar nerve anaesthesia. The most commonly used techniques, involve blocking of an entire portion of the inferior alveolar nerve:

Standard mandibular nerve block - The nerve is approached from the opposite side of the mouth, by angling the syringe from the premolars on the opposite side. Soon after piercing the mucosa and the buccinator muscle between the palatoglossal & palatopharyngeal folds until hitting bone (the ascending ramus), the syringe is drawn backwards slightly and brought parallel to the width of the ramus, so that the needle lies lateral to the medial pterygoid at the mandibular foramen.

Gow-Gates technique – This technique was invented by an Australian dentist George A.E. Gow-Gates in the mid-1970s. Here the needle is directed at the neck of the condyle just under the insertion of the lateral pterygoid muscle.[4]

Vazirani-Akinosi technique - Invented by Sunder J. Vazirani in 1960 and later reintroduced in 1977 by Oyekunle J. Akinosi, it is a closed-mouth injection technique, where the syringe is "advanced parallel to the maxillary occlusal plane at the level of the maxillary mucogingival junction." [5]

4. Areas of Numbness

Administration of anaesthesia near the mandibular foramen causes blockage of the inferior alveolar nerve and the nearby lingual nerve, supplying the tongue . This is why the numbing of the lower jaw during dental procedures causes patients to lose sensation in:

- their teeth (inferior alveolar nerve block)
- their lower lip and chin (mental nerve block)
- and their tongue & gums except on the cheek side of the molars (lingual nerve block).

5. Indications

An inferior alveolar nerve block is required to work in the following areas of the mouth:

- Mandibular teeth to the midline
- The anterior two thirds of the tongue
- The floor of the oral cavity[2]

6. Contraindications

Absolute contraindication

- Hypersensitivity to local anesthetic agents, which occurs in less than 1% of the general population.

Relative contraindication

- History of malignant hyperthermia.[2]

7. Equipment

Standard dental equipment should be present.

The examination table or chair can be adjusted to accommodate the patient's height.

An overhead light of sufficient intensity should be present.

Sterile thumb-control syringe.

Topical anesthetic (in the form of pastes or gels).

2% lidocaine with epinephrine or 0.5% bupivacaine with epinephrine.

Cotton-tipped applicators to administer topical anesthetic and control bleeding.

Ultrasonographic visualization of the inferior alveolar nerve using using a new 8- to 15-MHz transducer that is shaped like a hockey stick may allow for improved ultrasound-directed inferior alveolar nerve block injections.[6]

Small-gauge (ga) needles (The longer the needle, the easier the inferior alveolar nerve block is to accomplish.)

1 5/8 inch, 23 ga

1 3/8 inch, 25 ga; some recommend 1 1/8 inch, 27 ga needle

1 3/8 inch, 25 ga (probably the most popular choice of needle)

8. Complications

A failure rate of 15-20% is seen, even in experienced hands.

With an unsuccessful attempt, the patient experiences pain with no therapeutic benefit.

Inadequate anesthesia may also result from the formation of a blood clot due to the traumatized, lacerated, and bleeding vessel. The blood from the formation of a hematoma may dilute the local anesthetic solution. This may weaken the anesthetic effects.

Fracture of a dental needle while performing an inferior alveolar nerve block has been reported.[7]

Trismus and sensory deficit following resolution of trismus have been reported in 2 patients as delayed complications of inferior alveolar nerve block.[8]

Medial pterygoid trismus i.e. myospasm occurring after inferior alveolar nerve block has occurred.[9]

9. Conclusion

The inferior alveolar nerve block holds a significant place in dentistry as it saves the patient of the pain during during surgical and minor invasive procedures. They make the patient more comfortable and cooperative during treatment, thus making work easier and simpler for the dentist. Inferior alveolar nerve block which is considered to be a boon to both the patient and the dentist should be properly used after considering its indications and contra indications.

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