

## ORIGINAL RESEARCH

# Evaluation of Mandibular Nerve Block: A Clinical Study

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## ABSTRACT

**Purpose:** Clinical evaluation of the mandibular nerve block using various parameters.

**Materials and methods:** Inferior alveolar, lingual and long buccal branches of the mandibular nerve were blocked using 2% lignocaine hydrochloride with 1:80,000 epinephrine in a group of 100 healthy adult male patients who underwent surgical removal of impacted mandibular 3rd molar after obtaining written consent. Each of these patients was evaluated for various parameters, such as distribution of anesthesia, pain on injection, onset of action, and order of anesthesia following standard protocol.

**Results:** Out of the 100 patients who were given mandibular nerve block, pulpal anesthesia was achieved in all the patients. About 99% of the patients experienced lip anesthesia, 90% tongue anesthesia, 68% had cheek anesthesia, and only 37% experienced anesthesia of the chin. Moderate pain was experienced in 2% of the patients and the rest 98% had mild pain on injection. Minimum time for the onset of anesthesia was 0.5 minutes and the maximum time was 10 minutes. The cheek was the first to experience anesthesia, followed by the lip, tongue, and chin.

**Conclusion:** Our study would be of considerable help in understanding the various parameters, such as distribution of anesthesia, pain on injection, order of anesthesia, and onset of anesthesia. This in turn would reduce the unnecessary repetition of the nerve block and its associated complications.

**Keywords:** Inferior alveolar nerve block, Local anesthesia, Mandibular.

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## INTRODUCTION

One of the most common procedures in dentistry is the administration of a local anesthetic.<sup>1</sup> The inferior alveolar nerve (IAN) block is the most frequently used mandibular

injection technique for achieving local anesthesia (LA) for restorative and surgical procedures.<sup>2</sup>

In 1884, Halsted and Hall described the first inferior alveolar regional nerve block by injecting an anesthetic solution (cocaine) into the area of the mandibular foramen.<sup>3</sup> Then, Fischer described the classic technique that was modified later by many authors.<sup>4</sup> Nowadays, most of the dentists all around the world are using a technique similar to the one described by Jorgensen and Hayden in 1967, targeting the mandibular nerve.<sup>3,5</sup> There are various studies done on different types of local anesthetics used in dentistry, the different techniques to block the inferior alveolar, lingual, and the long buccal nerves, but very few studies have been done on the onset of action of anesthesia, the sequence of anesthesia of the soft tissues such as lip, tongue, cheek, and chin.

## MATERIALS AND METHODS

A total of 100 adult healthy male patients in the age group of 20 to 48 years who underwent surgical removal of the impacted mandibular 3rd molar were included in this prospective study. Written consent was obtained from all the patients. A cartridge containing 1.8 mL of 2% lignocaine with 1:80,000 epinephrine and 25 gauge needle was used in each patient. Inferior alveolar nerve block using direct technique was given. The total time taken to inject the solution in each patient was 1 minute. The whole procedure was carried out by a single operator. Out of the total 1.8 mL, 0.9 mL was injected to block the IAN; 0.6 mL was used to block the lingual nerve; and 0.3 mL was used to block the long buccal nerve. The subjective and objective signs and symptoms were assessed immediately after injection. The distribution of anesthesia, pain on injection, onset of anesthesia, and order or sequence of anesthesia, that is, time taken for anesthesia of each of the three branches of the mandibular nerve was evaluated separately in each patient.

## RESULTS

Out of the 100 patients who were given IAN block, pulpal anesthesia was achieved in all the patients. About 99% experienced lip anesthesia, 90% had tongue anesthesia, 68% had cheek anesthesia, and only 37% experienced anesthesia of the chin. Only one patient had no anesthesia of the lip, whereas ten patients had no anesthesia of the

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tongue, which is a rare occurrence; despite of this, patient had no pain during the dental procedure.

### **Pain on Injection**

Moderate pain was experienced only in 2% of the patients. The rest 98% had mild pain on injection.

### **Onset of Anesthesia**

*Lip:* Minimum time of onset was 1 minute and maximum time taken was 7 minutes. In most of the patients (37.37%) it took 2 minutes for the onset and in 29.29% it took 3 minutes. In eight patients (8.08%) it took only 1 minute for the onset. In only one patient it took 7 minutes for the anesthesia of the lip.

*Tongue:* Minimum time was 1 minute and maximum time was 6 minutes. Most of the patients (37.37%) got their tongue anesthetized in 2 minutes. In nine patients (10%) it took only 1 minute and in only one patient (1.11%) the onset of anesthesia took as long as 6 minutes.

*Cheek:* Minimum time taken was 0.5 minute and maximum time taken was 10 minutes. Most of them (44.92%) achieved anesthesia in 1 minute. In four patients (5.79%) the onset took only 0.5 minute and only in one patient (1.44%) the onset took as long as 10 minutes.

*Chin:* Minimum time for onset was 2.5 minutes and maximum time taken was 10 minutes. In most of the patients (29.72%) the onset time was 2.5 minutes. In three patients (8.10%) the onset took 1.5 minutes and in only one patient (2.70%), the onset took as long as 10 minutes.

### **Order of Anesthesia**

Out of the 100 patients evaluated for order of anesthesia, 49% experienced anesthesia in the cheek first; 32% in the lip, and only 19% in the tongue.

The lip was second to get anesthetized in 40% of cases. The tongue was second to get anesthetized in 40% of patients. In 12% of cases, chin was second to get anesthetized. In 7% of cases, cheek was the second to get anesthetized. Only in one patient (1%), both the tongue and the lip were second to get anesthetized as the time of onset was the same for both.

Tongue was the third to get anesthetized in 27% of patients. In 24% of the patients, lip was the third to get anesthetized. In 20%, chin was the third to get anesthetized. The cheek was the third to get anesthetized in 10% of patients.

### **DISCUSSION**

It is always taught that after a mandibular nerve block, the lip is the first to get anesthetized, followed by tongue and very rarely the chin and the cheek show the subjective

symptoms. There are no studies done that support this. Our study mainly addresses these issues.

The injection of an anesthetic solution for the IAN block has three phases: Initial needle insertion through the alveolar mucosa, needle placement to the target site, and deposition of the anesthetic solution at the target site. The IAN block has been associated with pain and discomfort. For the needle insertion phase, Nusstein and Beck,<sup>6</sup> in a retrospective study of 1,635 IAN blocks, reported an incidence of moderate to severe pain ranging from 14 to 22%. For the deposition of the anesthetic solution at the target site, various authors<sup>7-10</sup> have reported that the incidence of moderate to severe pain ranged from 20 to 40%. Therefore, it would be advantageous to decrease the pain of the IAN block. The two-stage injection has been suggested by Walton and Torabinejad<sup>11</sup> and Levine<sup>12</sup> as a way to decrease the pain of injection. This method involves initial placement of the anesthetic solution just under the mucosal surface. After waiting for several minutes for regional numbness, the injection is resumed and the remaining anesthetic solution is deposited at the target site. No clinical studies have addressed the two-stage injection technique to reduce the pain of injection. In our study we followed the one-stage injection technique, only 2% had moderate pain and the rest 98% had mild pain.

Onset of anesthesia for IAN block is 2 to 5 minutes as stated in various LA text books. There is no study done on this topic. In our study, the minimum time of onset of anesthesia was 0.5 minute for long buccal nerve block (cheek anesthesia). On an average, the minimum time taken for the onset of anesthesia was 1 minute for the lip, tongue, and the cheek. In the chin, the minimum time for the onset of anesthesia was 2.5 minutes. The maximum time taken for the anesthesia was 7 minutes for the lip, 6 minutes for the tongue, and 10 minutes each for the cheek and the chin. So it may take 0.5 to 10 minutes for the onset of anesthesia. Hence it is always apt to wait for a maximum time of 10 minutes before deciding to repeat the block, thus avoiding the unnecessary repetition of the block and LA overdose.

In a mandibular nerve block the lip is the first one to get anesthetized, followed by the tongue and very rarely the chin and the cheek show the subjective symptoms of anesthesia. In our study, in most of the cases, the cheek was the first part to get anesthetized, followed by the lip and the tongue. This could be explained by the fact that the long buccal nerve lies more superficial and the LA solution penetrates its membrane faster when compared to the IAN, which is more deeply seated.

Out of the 100 patients studied, only one patient did not experience any kind of numbness of the lip. This could be attributed to the cross innervations of the lip by the mental nerve branches of the opposite side or could be

due to an anatomical variation of the mental nerve of the blocked side. Hence, although there was no numbness of the anesthetized half of the lip, the patient had no pain as anesthesia of the lip and chin is not necessary for the extraction of molars.

Ten out of hundred patients had no anesthesia of the tongue, which is very rare and not reported till date. Still the patient did not have any pain during the procedure. This could be related to any anatomic variation/aberration.

Chaney et al<sup>13</sup> in their study found 100% of their subjects had subjective lip numbness and 83 to 93% had tongue numbness. Mental and lingual anesthesia, as evaluated by mucosal sticks, occurred in 83 to 97% of subjects, and buccal anesthesia ranged from 23 to 63%.<sup>13</sup>

In our study, no complication related to LA was noticed. Minimal possible amount of anesthetic solution was used to achieve adequate anesthesia. A total of 1.8 mL, of which 0.9 mL was used for IAN block, 0.6 mL was used for lingual nerve block, and 0.3 mL was used for long buccal nerve block. Direct technique was used, thus reducing the time of injection thereby also reducing the pain and agony associated with longer surgical procedure. This technique was also helpful in avoiding complications like needle breakage.

## CONCLUSION

Mandibular nerve block is performed to anesthetize the mandible and the structures attached to it. It is the workhorse for performing all the surgical procedures involving the mandible and the surrounding structures, most commonly used for the extraction of teeth, root canal treatment, periodontal surgeries, dental implant placement, and other minor oral surgical procedures.

This study focuses on the unattended issues, which would help in the better understanding of the technique by virtue of which the repetition of the block may be avoided, thus reducing the patient and doctor's agony and also the related LA toxicity. This study also proved that even low concentrations of LA solutions were sufficient to achieve adequate anesthesia. Direct technique of IAN block that was used in this study seems to be better

suitable as it reduces the pain on injection, the time taken for injection, and needle breakage.

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