

Original Article

# POSITIVE ASPIRATION AND ITS SIGNIFICANCE DURING INFERIOR ALVEOLAR NERVE BLOCK - A PROSPECTIVE STUDY

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## Abstract :

**Background and aims :** It is a basic rule to aspirate before injection when giving an inferior alveolar nerve block because the local anaesthetic may fail if the injection is given into a blood vessel, and the local anaesthetic solution may have undesirable systemic effects. There are reports that indicate aspiration is not performed in every injection. The aim of the present study was to assess the incidence of intravascular needle entrance in inferior alveolar nerve block injections.

**Patients and methods :** Interns and postgraduates of our institute performed inferior alveolar nerve block injections using conventional technique in 250 patients undergoing minor oral surgical procedures. The results of aspiration were reported. Aspirable syringes and 27 gauge long needles were used, and the method of aspiration was similar in all cases.

Data were analyzed using t-test.

**Results :** 20% of inferior alveolar nerve block injections were aspiration positive. Of all injections, 15.8% were intravascular on the right side and 14.8% were intravascular on the left. There were no statistically significant differences between right and left injection sites ( $P = 0.778$ ). Between the ages of 9 and 19 the incidence of intravascular penetration was significantly greater than at other ages (10/28 compared with 39/222,  $P = 0.04$ ).

**Conclusion :** Aspiration of the syringe after the needle had been placed in position for an inferior alveolar nerve block (but before the anaesthetic solution was injected) in 250 patients showed that the tip of the needle was in a blood vessel in 49 (20%). Aspiration of blood was significantly more common in patients aged 9–19 years than in all others ( $P = 0.04$ ). It seems that side of injection has no considerable effect in incidence of intravascular needle entrance.

**Keywords :** Inferior alveolar nerve, injection, local anesthesia.

## Introduction :

Local anesthetics are drugs that induce a transient and completely reversible state of loss of sensation in a circumscribed area of the body, caused by a depression of excitation in nerve endings or an inhibition of the conduction process in peripheral nerves.

hydrolyzing potency are metabolized by cholinesterase enzyme and removed from kidney in a more ionized form compared to amides<sup>1</sup>.

Main drugs of amide group are lidocaine, mepivacaine, and prilocaine. Main esters include tetracaine, benzocaine and procaine<sup>1</sup>. Local anesthetic solution may contain a vasoconstrictor in addition to the local anesthetic agent.

High dose or accidental intravascular injection of local anesthetic agent with vasoconstrictor may result in cardiovascular and central nervous system toxicity, as well as tachycardia and hypertension<sup>1,6,8</sup>. Primary signs and symptoms of overdose are hypertension, tachycardia, tachypnea, headache, and vertigo. Other symptoms that

These drugs can be categorized as amides and esters<sup>1</sup>. Amides are metabolized in liver by microsomal enzymes and mainly removed from kidney in unionized form. Esters which have high

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may occur later are vision or auditory disorders, anesthesia of tongue and perioral areas or chill. If the blood level of the drug continues to increase, it can lead to unconsciousness, breathing depression and arrest.

A number of factors increase the toxicity potential of anesthetic agents including age, weight, pregnancy, hereditary deficiency of cholinesterase enzyme, blood vessel constriction, technique and speed of injection, the blood supply in area of injection, and vasoconstrictors which are added to anesthetics to slow down absorption and reduce bleeding<sup>1-5</sup>.

Accidental injection into the vessels may occur in all intra-oral injection techniques; however, when injecting into a highly vascular area, such as the pterygomandibular space during inferior alveolar nerve block injection, there is always the increased risk of an intravascular injection, vascular damage and hemorrhage with hematoma formation<sup>5,9</sup>.

Using aspirable syringes, avoiding needles smaller than 25 gauge, slow injection and aspiration in two different places can minimize incidence of injection into the vessels. Therefore, aspiration is necessary to avoid intravascular injection<sup>9</sup>.

Considering the facts that intravascular injection may lead to overdose and toxicity and that there is a high risk of intravascular injection in IANB, the aim of this study was to assess the incidence of positive aspiration during inferior alveolar nerve block injections.

**Patients and Methods :**

We studied inferior alveolar nerve blocks in 250 patients at the department of oral and maxillofacial surgery at our institute, Mangalore, Karnataka, India.

A Luer syringe with a 24G needle 32mm long was used. The needle was directed from the opposite quadrant premolar area towards the mandibular foramen. After the needle had made contact with the bone, it was withdrawn 2–3mm and the piston of the syringe was drawn back so that the entry of blood into the syringe could be seen.

The method of aspiration was similar in all cases. Two aspirations were performed before injection with the needle bevel in different directions. If blood was aspirated the needle was withdrawn and the injection repeated.

Age of the patient, injection technique, side of injection, and aspiration result were recorded. Data were analyzed using t-test.

**Results :**

This study included 250 patients undergoing inferior alveolar nerve block injections using conventional technique.

51.6% of them were performed by post-graduates and 48.4% by interns.

51% of them were injected on the right side of mandible and 49% of them on the left.

Positive aspiration was observed in 17.82% and 22.31%, of IANB injections performed by postgraduates and interns respectively (Table 1). There were no statistically significant differences between the operators in aspiration results (P = 0.754).

Overall incidence of needle entrance into the vessel was 20%.

Of all injections, 15.38% were intravascular on the right side and 15.03% were intravascular on the left. The difference between intravascular injections on the right and left sides was not statistically significant (P = 0.778).

Between the ages of 15 and 19 the incidence of intravascular penetration

was significantly greater than at other ages (10/28 compared with 39/222, P = 0.04).

**Table 1 : Incidence of aspiration of blood before inferior alveolar nerve block according to age and sex**

	Number of IANBs (%)	No. of Positive Aspiration (%)
Post-graduates	129	23 (17.82%)
Interns	121	26 (22.31%)
Total	250	49 (20%)

### Discussion :

Intravascular injection of local anaesthetic during inferior alveolar nerve block is common<sup>8,9</sup>. According to some authors aspiration is not necessary because intravascular injection of local anaesthetic is rare (frequency 0.5%).

These authors maintained that even if that does happen, the amount of solution contained in one anaesthetic cartridge (2%, 1.8 ml) is not enough to be toxic.

Most authors do not agree with this, however, and consider aspiration before an inferior alveolar nerve block to be necessary. Injection to a highly vascular area such as pterygomandibular space during an inferior alveolar nerve block has a high risk of intravascular needle entrance. Accidental intravascular injection of local anesthetic agent with vasoconstrictor may result in cardiovascular and central nervous system toxicity, as well as tachycardia and hypertension<sup>6,7,8,9</sup>.

The haemodynamic effects of a local anaesthetic with 1:100,000 vasoconstrictor have been studied in healthy people<sup>3</sup>. This concentration does not cause substantial changes to the cardiovascular system when intravascular injection of the local anaesthetic is avoided. However, greater concentrations (>1:50 000), or even the rapid intravascular injection of the cartridge of anaesthetic solution, may have dangerous haemodynamic effects in patients with cardiovascular disease.

According to the results of this study, the rate of intravascular needle entrance in inferior alveolar nerve block injections was 20%, which is a relatively high

incidence. This notable finding emphasizes the necessity of aspiration before IANB injections.

The total rate of intravascular needle entrance during IANB injections was higher than the result of a previous study (11.7%)<sup>1</sup>.

According to the current study, it seems that the side of injection has no considerable effect in incidence of intravascular needle entrance.

It seems that the rate of intravascular needle entrance might be higher among general dental practitioners, though not statistically significant in this study. General dental practitioners should be encouraged to consider the potential for anatomical complications when administering any dental local anesthetic. Failure to do so can result not only in less-than optimal local anesthesia but, more significantly, in minor – perhaps major – consequences in the form of local and systemic complications.

### Conclusion :

The high incidence of intravascular injection during inferior alveolar nerve block that we found proves that aspiration is necessary because the failure of anaesthesia is accompanied by an increased likelihood of serious systemic complications, which may even endanger the life of the patient.

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