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Comparative analysis between direct Conventional Mandibular nerve block and Vazirani-Akinosi closed mouth Mandibular nerve block technique

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ABSTRACT

Introduction: Over the years different techniques have been developed for achieving mandibular nerve anaesthesia. The main aim of our study was to carry out comparison and clinical efficacy of mandibular nerve anaesthesia by Direct Conventional technique with that of Vazirani-Akinosi mandibular nerve block technique.
Materials and Methods: 50 adult patients requiring surgical extraction of premolars, mandibular first, second and third molars were selected randomly to receive Direct Conventional technique and Vazirani- Akinosi technique for nerve block alternatively.
Results: No statistically significant differences were observed regarding complete lip anaesthesia at 5 minutes and 10 minutes, nerves anaesthetized with single injection, effectiveness of anaesthesia, supplementary injections and complications in both the techniques. However, onset of lip anaesthesia was found to be faster in Vazirani-Akinosi technique, patients experienced less pain during the Vazirani-Akinosi technique as compared to the Direct Conventional technique. Post injection complication complications were less in the Vazirani-Akinosi Technique.
Conclusions: Except for faster onset of lip anaesthesia, less pain during injection and fewer post injection complications in Vazirani-Akinosi technique all other parameters were of same efficacy as Direct Conventional technique. This has strong clinical applications as in cases with limited mouth opening, apprehensive patients Vazirani-Akinosi technique is the indicated technique of choice.
Keywords: Conventional Mandibular Nerve block, Vazirani Akinosi technique, closed mouth mandibular nerve block

INTRODUCTION

The Akinosi mandibular block technique, first described in 1977[1] is a closed-mouth intraoral approach to nerve block anesthesia of the mandibular nerve. A bolus of local anesthetic is delivered into the superior portion of the pterygomandibular space, where it affects the inferior alveolar, lingual, and long buccal nerves (Figure 1). Conventional techniques rely on the presence of certain anatomical landmarks-the coronoid notch, occlusal plane, and the pterygomandibular raphe. Anatomical variations in shape and size of the mandible and the position of the mandibular foramen relative to the occlusal plane may make accurate localization of the mandibular foramen difficult, thereby contributing to the reported failure rates of up to 15% of conventional inferior alveolar nerve blocks [2].

With the Akinosi technique, the patient's teeth are closed into occlusion, and the cheek is retracted to expose the posterior teeth. The needle is positioned at the level of and parallel to the mucogingival line of the maxillary molars (Figure 2 and Figure 3). The needle is inserted as closely as

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possible to the medial surface of the ramus and is advanced to a depth of 2.5 to 3.0 cm into the area between the maxillary tuberosity and the mandibular ramus. After negative aspiration, the contents of a standard dental anesthetic cartridge are deposited. Advantages of the Akinosi technique over conventional techniques include the ease by which the technique may be mastered, the possibility of achieving anesthesia of the three major nerves innervating the mandible with a single injection, and the possibility that apprehensive patients will find the technique less threatening because the injection is performed with the patient's mouth in a closed position [3]. This investigation evaluated the efficacy of the Akinosi mandibular block technique in achieving local anesthesia for the removal of impacted mandibular third molars. A within-subject design was used to compare onset of anesthesia, quality of anesthesia, branches of the mandibular nerve affected, and intraoperative hemostasis achieved with both the Akinosi technique and conventional techniques of local anesthetic administration.

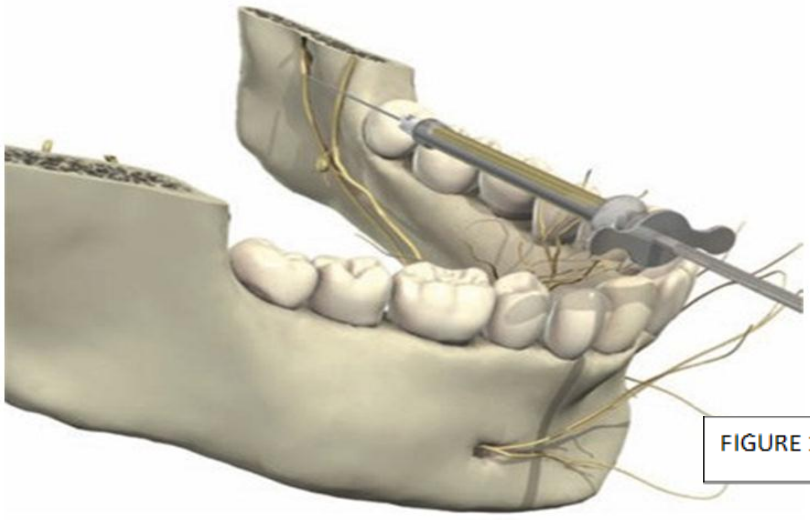

FIGURE 1

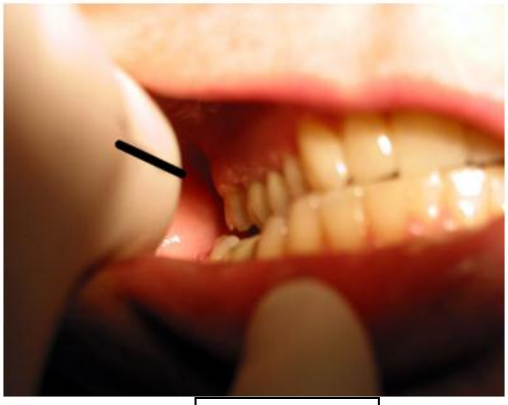

FIGURE 2

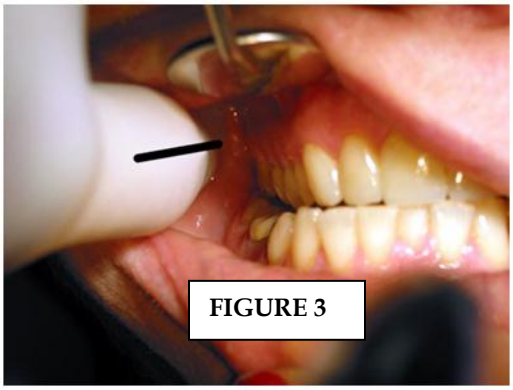

FIGURE 3

MATERIALS AND METHODS

Fifty consecutive patients in need of extraction of mandibular premolars, first, second and third molars were selected. 24 gauge needle was used for the Direct Conventional technique while 26 gauge needle was used for the Vazirani-Akinosi technique Conventional mandibular injections [4, 5] were given using 2% lidocaine with l:8O,OOO epinephrine. A volume of 1.6 ml was administered for the inferior alveolar nerve block; for the lingual nerve block 0.2 ml: and for the buccal nerve block, 0.5 ml. The sequence of injection was randomized. The closed mouth injection was given as described by Vazirani-Akinosi [1, 6]. The needle was inserted at the level of the buccal gingival margins of the upper molar teeth to a depth of 25-30 mm and 1.5-2 ml of anaesthetic solution was deposited. In the case of patients with an edentulous maxillary arch, the crest of the remaining alveolar ridge represented the level at which the needle was inserted. An aspiration test was performed. In patients receiving a conventional block, a buccal infiltration was also given for the long buccal nerve. Patients recorded their pain experience on a 100 mm

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visual analogue scale following the injection [7]. The subjects were asked to report any unusual symptoms during and after the injection. The surgical protocol consisted of the injection of local anesthesia on one side using one of the techniques at random, and the completion of surgery on that side. Lingual nerve anesthesia was assessed by questioning the patient about altered tongue sensation and by probing the lingual gingiva. Buccal nerve anesthesia was assessed by probing in the buccal gingival sulcus opposite the mandibular second molar. After lip paraesthesia was noted, the surgical procedure was begun. The mandibular premolar/molars were removed using a standard surgical technique. Parameters observed were:

1. Pain during injection: the pain during injection was measured using a visual analogue scale

2. Time of onset of lip anaesthesia: Five minutes after the first injection was completed, the onset of mandibular paraesthesia was assessed by questioning the patient.

3. Complete lip anaesthesia at 5min and 10 min interval: If altered sensation in the lower lip was not present 5 minutes after the first injection, another 5 minutes was allowed to lapse and then onset of paraesthesia was reassessed. If there was not altered lip sensation at the end of the second 5 minute period, the injection was repeated.

4. Nerves anaesthetized with a single injection: Lingual nerve anesthesia was assessed by questioning the patient about altered tongue sensation and by probing the lingual gingiva. Buccal nerve anesthesia was assessed by probing in the buccal gingival sulcus opposite the mandibular second molar.

5. Frequency of supplementary injection: This was the 2nd injection given if patient experienced any pain or discomfort, which was unbearable by the patient. The technique for this was same as that of 1st injection. If even after the supplementary injection, anaesthesia was not adequate or was absent.

6. Complications or any undesired results if any: tingling of upper lip, blanching of skin of infra orbital region, light headedness and palpitation were some of the undesired results which were anticipated.

RESULTS:

The values for complete lip anaesthesia at 5 min and 10 min, nerves anaesthetized with single injection, effectiveness of anaesthesia, supplementary injections and complications are shown in table no. 2,3,4,5 and 6 respectively. There was no statistically significant difference found between the two groups.

Table no. 1 describing onset of lip anaesthesia showed, the calculated value of 't' to be 1.996 whereas the critical value from the table at 5% was 1.679 and at 1% it was 2.410. Hence, the difference observed between the two techniques in respect to onset of lip anaesthesia was found to be statistically significant at 5% level. Thus suggesting the onset of lip anaesthesia was faster in Vazirani-Akinosi [5, 6].

TABLE 1
ONSET OF LIP ANAESTHESIA

Sample Name	No.of Observations.	Mean	S.D.	C.V. (%)	S.E.of Mean	Confidence Limits 95%	Confidence Limits 99%
DC	25	1.900	0.464	24.4	0.095	1.705 – 2.095	1.635 – 2.165
VA	25	1.617	0.516	31.9	0.105	1.400 – 1.835	1.323 – 1.912

Sample-1	Sample-2	t-Statistic	D.F.	Nature	Computed	Crit. (5%)	Crit. (1%)
DC	VA	1.996	48	significant		1.679	2.410

DC: Direct Conventional technique
VA: Vazirani-Akinosi technique

TABLE 2
COMPLETE LIP ANAESTHESIA AT 5 MINUTES AND 10 MINUTES INTERVAL

Sample	5 Minutes	10 Minutes	Total
DC n	22	24	46
VA n	17	21	38
Total n	39	45	84

N=25 Computed Chi-square (1d.f.) = 0.762
Critical Chi-Sq. at 1 D.F. at 5% and 1% levels 3.840 6.630
DC: Direct Conventional technique
VA: Vazirani- Akinosi technique

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TABLE 3
NERVES ANAESTHETIZED WITH SINGLE INJECTION

Sample	IA	LNG	LB	Total
DC n	24	25	25	74
VA n	21	21	20	62
Total n	45	46	45	136

N= 25 Computed Chi-square(1 d.f.) =1.059
Critical Chi-Sq. at 1 D.F. at 5% & 1% Levels:3.840 6.630

DC: Direct Conventional technique
VA: Vazirani-Akinosi technique
IA: Inferior Alveolar nerve
LNG: Lingual Nerve
LB: Long Buccal Nerve

TABLE 4
SUPPLEMENTARY INJECTIONS

Technique	Required	Not Required	Total
DC	1	24	25
VA	4	21	25
Total	5	45	50

Computed Chi- Square (1 d.f.) = 2.00
DC: Direct Conventional technique
VA: Vazirani-Akinosi technique

It was seen that the Vazirani-Akinosi technique required more number of supplementary injections for complete mandibular nerve block. (Table 4)

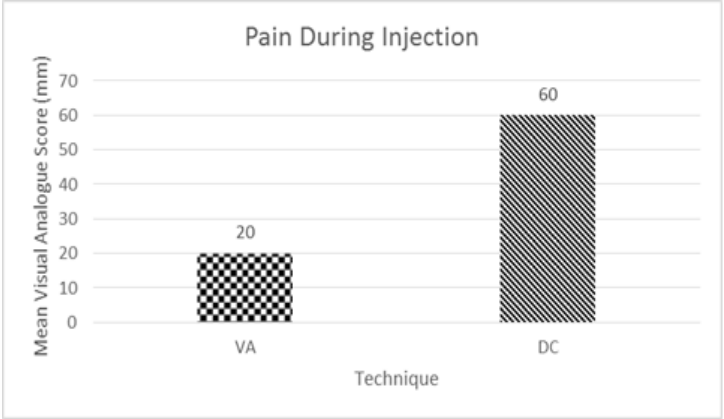
TABLE 5
COMPLICATIONS

Technique	Post Injection pain	Trismus	Syncope	7th Cranial Nerve Palsy	Total
DC	3	4	4	0	25
VA	0	0	2	1	25

DC: Direct Conventional technique
VA: Vazirani-Akinosi technique

It was recorded that complications like post injection pain, trismus and syncope were seen mostly in the Direct Conventional technique. (Table 5)

GRAPH 1 REPRESENTATION OF MEASUREMENT OF PAIN DURING INJECTION IN BOTH THE TECHNIQUES



DC: Direct Conventional technique
VA: Vazirani-Akinosi technique

DISCUSSION

Even though the subjects were not told directly which injection technique they were receiving, the more dentally experienced ones would have found the closed-mouth injection "different". While this may have compromised the double-blind nature of the study design it was not likely to have affected the validity of the results because the subjects did not need to compare the 2 techniques. Where the closed-mouth injection resulted in inferior alveolar and lingual anaesthesia but no long buccal anaesthesia, the block injection was not repeated. Instead, a buccal infiltration injection was given prior to extraction.

This was consistent with the study design, and was clinically justified. Such injections did not, however, qualify as supplementary injections. As the conventional injection does not purport to block the long buccal nerve, valid comparisons with the closed-mouth can only be made with regard to inferior alveolar and lingual nerve anaesthesia.

Subjects in the Direct Conventional group experience significantly more pain during injection than the subjects in the Vazirani-Akinosi group. This can be attributed to the 26 gauge needle used for the Vazirani-Akinosi technique which has smaller dimensions used than the 24 gauge needle used for the Direct Conventional technique. Another factor contributing to less pain experienced by subjects during the Vazirani-Akinosi technique was divergence of medial pterygoid muscle from ramus to lateral pterygoid process giving greater width of pterygomandibular space superiorly (Gow-Gates et al [16], Barker et al [17]) hence, reducing the chances of needle to pen-

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etrate the medial pterygoid muscle.

The lower success rate of the closed-mouth technique may be attributed to the factor of the deposition of the anaesthetic solution outside the confines of the pterygomandibular space resulting in insufficient perfusion of the nerve [8]. The lack of bony landmarks of the target area makes this likely and may explain the cases of posterior superior alveolar and infra-orbital nerve anaesthesia observed in this study.

After injecting local anaesthetic solution, in both the techniques, time allowed for noting altered lip sensation was 5 minutes. If no response was found, another 5 minutes lapse was allowed. This was done in accordance to the study done by Peterson [9] who suggested slow dispersion of the solution after injecting into the pterygomandibular space. Moreover, these 5 minutes or, if required, total 10 minutes can also be used to build rapport with the patient and make the patient at ease. The onset of anaesthesia, was recorded to be faster in Vazirani-Akinosi technique [1, 6] (1.6 minutes mean) than Direct Conventional technique [4, 5] (1.9 minutes mean), which was statistically significant. These confirmed the findings of Akinosi [1], Gustainis and Peterson [10] and Sisk [11]. This may be due to the close needle position to the anatomic location of theses nerves and encountering them through diffusion and / gravity. Additionally, former also avoided the possible variable position of mandibular foramen. However, Yucel and Hutchison [12], Todorovic et al [13] and Martinez et al [14] reported rapid onset of anaesthesia in Direct Conventional technique.1,4 It is reasonable to assume that the skill in performing Direct Conventional technique [4,5] was much greater due to everyday practice Todorovic et al [13]. The onset of complete lip anaesthesia in 5 minutes & 10 minutes was found to be faster in Direct Conventional technique [4, 5]. This was in accordance to the study of Donker et al [15] and Yucel and Hutchison [12]. Although statistically insignificant, this may be due to the proportionately larger diameter of the nerve fibres present in the upper portion of pterygomandibular space. So, it takes greater time to reach the core fibres of the nerves and produce complete lip anaesthesia. In contradiction to this, Sisk [11] reported Vazirani-Akinosi technique [1, 6] to have more percentage of cases of complete lip anaesthesia within 5 min and 10 min. The incidence of inferior alveolar nerve and lingual nerve anaesthesia with single needle puncture was found to be lower in Vazirani-Akinosi technique [1, 6]. The most probable reason for this may be explained as lack of bony landmarks and failure to appreciate the flaring nature of ramus. Although Vazirani-Akinosi technique [1, 6] may sometimes require additional injection for buccal nerve, the number of cases for this were not many. Therefore, reducing the extra dose of local anaesthetic required. This was same as reported by Sisk [11] but was more than the reported value of 71% by Donker et al. [15] As Direct Conventional technique in the present study used separate needle puncture to achieve buccal nerve anaesthesia, valid comparison cannot be made for this nerve. The frequency of supplementary injections was found to be higher in Vazirani-Akinosi technique [1, 6] .This was similar to the studies of Donker et al [15] and Yucel and Hutchison [12]. This may be due the lack of sufficient bony landmarks and failure to appreciate the flaring nature of the ramus, causing deposition of anaesthetic solution outside the confines of pterygomandibular space. Various complications like post-injection pain and trismus were reported only in Direct Conventional technique [4, 5] This reduced incidence in Vazirani-Akinosi technique [1, 6] may be attributed to the divergence of medial pterygoid muscle from ramus to lateral pterygoid process giving greater width of pterygomandibular space superiorly (Gow-Gates et al [16], Barker et al [17]) hence, reducing the chances of needle to penetrate the medial pterygoid muscle. More cases of syncope were encountered in Direct Conventional [4, 5] than Vazirani-Akinosi technique [1, 6]. This is because in latter technique the mouth of the patient is closed and feeling of injection into the throat is not present (Akinosi) [1] thus, decreasing the level of anxiety and apprehension. 7th nerve palsy was reported in Vazirani-Akinosi technique [1, 6] only. Possibly, the 7th nerve palsy occurred due to over insertion of the needle and deposition of anaesthetic solution deep into the parotid gland (Bennet) [4] . No case of infection was reported due to the usage of disposable needles, syringes, aseptic techniques and sterile solutions throughout the study. Sloughing, soft tissue injury, anaesthesia or paresthesia, needle breakage, hematoma were not encountered during the study. However, no significant difference was found in between the two techniques with this respect.

CONCLUSIONS:

It may be concluded from the analysis in the present study that the Vazirani-Akinosi technique was statistically superior to Direct Conventional technique in case of onset of lip anaesthesia only. With regard to all other parameters, the two techniques have been found to be almost identical showing no statistical differences in their effect. In patients having limited mouth opening, like in infection and trauma, the importance of Vazirani-Akinosi technique cannot be underestimated. Above all, Vazirani-Akinosi technique shows as much efficacy as Direct Conventional technique, thus having strong clinical implications.

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