

Akinosi (Tuberosity) Technique: A Verity but under-utilised Mandibular Nerve Block Technique

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ABSTRACT:

BACKGROUND: Profound local anaesthesia is a desired clinical condition in surgical treatment of lesions in the oral cavity. This is because patients' cooperation is better assured with a pain-free field of operation. In dentistry this is usually achieved by either infiltration or block anaesthesia. The inferior alveolar nerve (IAN) block is the main block anaesthesia employed in dentistry, particularly for mandibular procedures. Different techniques of achieving this block anaesthesia have been described. The two commonly used of these techniques are standard technique (ST) and Akinosi technique (AT). The objectives of this study were to determine the more commonly used IAN block technique and the success rate in a self-referral dental clinic.

PATIENTS AND METHOD: This was a retrospective study that included patients treated between January, 1993 and December, 1995. Records of the patients treated within this period were examined to determine which of the two anaesthetic nerve block techniques was more frequently used in achieving deep analgesia for their mandibular procedures.

RESULTS: Of the 480 patients that were treated with block anaesthesia, 392 (81.7%) were treated with standard technique while 88 (18.3%) were treated with Akinosi technique.

CONCLUSION: Dental Surgeons in the clinic utilised standard nerve block technique more frequently than the Akinosi technique in their mandibular procedures inspite of the reported higher merits of Akinosi techniques.

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INTRODUCTION

Surgical procedures on mandibular tissues are commonly performed under mandibular nerve block anaesthesia¹. This is because the mandible and its contiguous soft tissues are innervated by the mandibular division of the trigeminal nerve. The trigeminal nerve consists of motor and sensory branches which are distributed through the anterior and posterior roots. The anterior division is mainly motor with the buccal nerve as its sensory twig, while the posterior division gives off the inferior alveolar nerve as its largest terminal sensory branch. Block anaesthesia of the inferior alveolar nerve usually offers a field of sensory anaesthesia of the

mandibular tissues that is similar to that offered by blocking the main trunk of the mandibular nerve. This fact apparently explains the reason why many clinicians interchange the names of inferior alveolar nerve block and mandibular nerve block in referring to the same concept of block anaesthesia.

The commonest technique of mandibular nerve block applied by clinicians in dentistry is the open mouth technique² which is also known as the standard technique (ST). This technique which was described by Jorgensen and Hayden in 1967 relies on adequate mouth opening and anatomical landmark that requires needle contact with bone of the medial ramus close to the mandibular foramen. Anatomical variations of the mandibular foramen often occur and these have been reported to cause inability to anaesthetise both the main trunk of the nerve and the accessory innervation pathways². There is also the added challenges presented by patients that have trismus or those that experience gag reflex induced by intraoral palpations while applying the standard technique nerve block in surgical procedures³. These problems have led to a significant failure rate of 15-20% in the patients whom the standard technique nerve block are applied¹⁻³. Attempts to overcome the failures experienced in this anaesthetic technique often result in multiple injections which may not go without other complications such as haematomas and inflammations⁴ at the injection sites. Fortunately, these challenges can be addressed by a close mouth technique⁵⁻⁷ which ensures deposition of anaesthetic solution at a higher level along the mandibular nerve trunk. This relatively simple technique was described by Joseph Akinosi in 1977² in an article published in the British Journal of Oral Surgery.

As explained by the author, the point at which the anaesthetic solution is deposited is at a more proximal level on the mandibular nerve trunk before its separation into the distal branches. Because of this proximity in the deposition of the anaesthetic solution, the buccal and lingual nerves, including the sensory supply to mylohyoid muscle and occasionally cervical accessory supplies are anaesthetized at once. The AT also has been credited with the added advantage of rapid induction of anaesthesia within less than sixty seconds of administration.

In applying the AT injection, the oral cavity is prepared with oral antiseptics to sterilize the point of needle

penetration³. The patient is relaxed and seated in a semi-reclining position with the teeth in occlusion. Then with the non-operating hand, the lip and cheek are retracted and the already loaded syringe with long needle is brought and aligned parallel to the occlusal surface of the teeth. The needle is introduced through the mucogingival junction at the level of the third molar tooth, medial to the ramus and lateral or tangential to the maxillary tuberosity. When the needle hub is at the level of the second molar, about 2-3cm needle penetration into the soft tissue must have been achieved, the anaesthetic solution is then slowly dropped in the pterygomandibular space. The point at which the anaesthetic solution is deposited is well above the point of needle-bone contact witnessed in the ST procedure and therefore, more nerve branches on the ipsilateral side of the mandible are anaesthsized in this technique. This procedure is widely described in the literature²⁻⁵.

The numerous advantages associated with AT are expected to make it attractive for more frequent applications. In this study therefore, we determined which of the two types of techniques (ST and AT) was used to achieve mandibular nerve blocks.

PATIENTS AND METHOD

In Pilgrims Dental Clinic, Enugu, Nigeria, the method of securing regional block anaesthesia for procedures involving the mandibular tissues was by two techniques: the standard (open mouth) technique and the Akinosi technique. One or two cartridges of 2% xylocaine with 1:80,000 adrenaline were usually administered for a successful single mandibular procedure. For each mandibular procedure, one of the local anaesthetic techniques (ST or AT) was utilised by the general dental practitioners for achieving the pain-free field. We retrieved case notes of the patients treated between January, 1993 and December, 2005 to determine which of the two anaesthetic techniques were applied more. Data on diagnostic indications and type of block anaesthetic techniques were obtained.

Patients whose regional anaesthesia were achieved by the standard open mouth technique using one or two injection cartridges were included as successful standard technique, while the patients that received Akinosi (tuberosity) technique for their block anaesthesia with one or two cartridges of xylocaine were recorded as successful Akinosi technique.

Excluded from the study were multiple injection technique blocks, or blocks that received additional or supplementary intraligamental, topical and infiltration anaesthesia. Procedures that received more than two xylocaine injections in each technique were recorded as failed technique.

RESULTS

A total of 480 mandibular nerve blocks were administered during the period. Of this number, 392 (81.7%) were by standard technique and 88 (18.3%) by Akinosi technique. Out of the 392 ST blocks, 88% were successful while 12% failed. Of the 88 AT blocks, 96.6% were successful while 3.4% failed. Clinical procedures for which the different mandibular blocks were given, including the success and failure rates of the different techniques are shown in table 1.

Table 1: Procedures and Mandibular Block Techniques

Clinical procedures:	Nerve block techniques			
	ST =392(81.7%)		AT=88(18.3%)	
	Successful	failed	Successful	failed
Exodontia, tumour excision,cavity/crown preparation, reduction and immobilisation.	345(88%)	47(12%)	85(96.6%)	3(3.4%)

DISCUSSION

Akinosi technique (AT) offers a profound local anaesthesia of the ipsilateral mandibular tissues^{1,2}. This technique is also associated with impressive high rate of success above 96%^{3,4}. In this study, we found a success rate of 96.6% which is similar to reports in the literature¹⁻⁴. The high success rate usually recorded in AT is attributed to the deposition of the anaesthetic solution at a level higher or proximal on the mandibular nerve trunk. This level of deposition of the solution exposes more nerve branches on the mandibular nerve trunk to the anaesthetic solution, and this culminates to a more profound regional anaesthesia^{5,6}.

Occasionally, some accessory innervation pathways may be involved in the supply of sensory to the tissues and these are better anaesthsized in AT because of its proximal level in depositing the anaesthetic solution. Those accessory pathways are usually missed when the anaesthetic solution is deposited in the pterymandibular space at more distal or close to the mandibular foramen which is the case in ST block⁷.

Of the 480 block injections recorded in the clinic within the study period, 81.7% were ST with 88% success while 18.3% were AT with 96.6% success. In spite of the higher success rate associated with AT, the clinicians seemed to prefer the ST to the AT as seen in the frequency of application. This finding is in line with various reports in the literature^{1,3,7-9}. The failed three AT

injections were probably due to faulty technique by the operators. The failed STs were found to have been rectified by resorting to alternative methods such as the AT.

We felt that the low utilization of the AT in spite of its high success rate could be due to a 'band wagon' effect the ST seemed to have on the clinicians. Band wagon effect refers to a trend in which the clinicians adhere to the technique they received more emphasis on during their training and despite obvious merits of the alternative, they were often not enthusiastic on embracing the alternative method. The alternative technique was often considered a mere academic exercise because of the less emphasis placed on it during academic demonstrations. Such procedures were not often applied during clinical procedures.

Every clinical dentist experiences local anaesthetic failure at one time in spite of presumed technical accuracy and therefore, 100% efficiency is utopia⁸⁻¹⁰. Nevertheless, such failed anaesthesia are usually rectified by giving more injections, and sometimes by correcting the needle penetration¹¹⁻¹³. Faulty technique^{1,14} was responsible for the failed anaesthesia in AT. Faulty operator-technique could arise from reduced distal bucco-tuberosity space. This could arise from dense buccal pad which would reduce visualisation of the space for needle penetration. Torus on the alveolar bone adjacent to the buccal space could distort or alter the point of needle penetration, thereby contributing to the faulty operator-technique.

The high incidence of anaesthetic failure associated with ST both in this study (12%) and in the literature, apart from operators' error, could arise from alterations in anatomical landmark, accessory and supplementary innervations from ipsilateral and contralateral sides of the jaw, inflammations and abscesses which could be associated with dental lesions such as pulpitis, pericoronitis and traumas¹⁴.

CONCLUSION

AT offers a satisfactory means of obtaining mandibular nerve block anaesthesia. Therefore, embracing this technique in the routine clinical procedures that require mandibular nerve block will forestall the high incidence of failed anaesthesia often witnessed in ST. It will also obviate the problems of haematoma that are associated with multiple needle pricks in repeated ST injections while trying to address the failed attempts. We

encourage clinicians to utilise AT technique in their mandibular procedures that require block anaesthesia.

REFERENCES

1. Meechan JG. How to overcome failed local anaesthesia. *Brit Dent J* 1999; 186, 15-20.
2. Gustainis F James, Peterson J Larry. An alternative method of mandibular nerve block. *J Amer Dent Assoc* 1981; 103: 33-36,
3. Johnson, T M. Badovinac, R. Shaefer J. Teaching Alternatives to the Standard Inferior Alveolar Nerve Block in Dental Education: Outcomes in Clinical Practice. *J Dent Educ* 2007; 71 :1145-1152.
4. Malamed SF. Handbook of local anaesthesia. 4th ed. St. Louis: Mosby, 1997. Pp193-219.
5. Sisk AL. Evaluation of the Akinosi mandibular block technique in oral surgery. *J Oral Maxillofac Surg* 1986; 44 : 113-5.
6. Madan GA, Madan SG, Madan AD. Failure of inferior alveolar nerve block. Exploring the alternatives. *J Am Dent Assoc* 2002; 133: 843-846.
7. Matthews R, Ball R, Goodley A, Lenton J, Riley C, Sanderson S, Singleton E. The efficacy of local anaesthetics administered by general dental practitioners. *Br Dent J* 1997; 182:175-178.
8. Kaufman E, Weinstein P, Milgrom P. Difficulties in achieving anaesthesia. *J Am Dent Assoc* 1984; 108: 205-208.
9. Wong RKS, d Jacobsen PL. Reasons for local anesthesia failures. *J Am Dent Assoc* 1992; 123: 69-73.
10. Darlington H. If you fear the dental needle, ask for the Gow-Gates or Akinosi technique. Idea Marketers.com. <http://www.ideamarketers.com>. Accessed on 9/4/2011
11. Todorovic L, Stajcic Z, Petrovic V. Mandibular versus inferior dental anaesthesia: Clinical assessment of 3 different techniques. *Int J Oral Maxillofac Surg* 1986; 15: 733-8
12. Gaum LI, Moon AC. The "ART" mandibular nerve block: a new approach to accomplishing regional anaesthesia involving the inferior alveolar nerve (V3). *J Can Dent Assoc* 1997; 63 : 454-9.
13. Jacobs S. Haas DA. Meechan JG. May S. Injection pain. Comparison of three mandibular block techniques and modulation by nitrous oxide: oxygen. *J Am Dent Assoc*, 2003; 134: 869-876
14. Blair GS, Meechan JG. Local anaesthesia in dental practice 1. A clinical investigation of a self-aspirating system. *Br Dent J* 1985; 159: 75-77.