

DENTAL PRACTITIONER'S CHOICE OF LOCAL ANESTHESIA TECHNIQUE FOR MANDIBULAR MOLAR ANESTHESIA

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ABSTRACT

The provision of many dental treatments depends upon achieving effective local anesthesia. The conventional inferior alveolar nerve block is the most commonly used nerve block technique. In certain cases however this nerve block fails even when performed by the most experienced operators, so in those cases a supplemental local anesthesia technique should be used in order to achieve satisfactory local anesthesia

This study was aimed to document initial and supplemental local anesthesia techniques that dental practitioners of Lahore use in their practices to achieve mandibular molars anesthesia for general dental procedures like fillings, root canals and extractions. A descriptive survey of general dental practitioners in Lahore was conducted. A questionnaire was made to collect the data which consisted of 6 questions.

A total of 160 dental practitioners responded to the survey. Inferior alveolar nerve block was the most favoured primary local anesthesia technique (96.3%) whereas intraligamentary was the most frequently used supplemental local anesthesia technique (37.8%).

Key Words: *Mandibular local anesthesia, Inferior alveolar nerve block, Gow-Gates technique, Vazirani akinosi technique, infiltration, intraligamentary, mandibular molar teeth, supplementary local anesthetic technique.*

INTRODUCTION

Inferior Alveolar Nerve Block (IANB) is the most widely accepted method of achieving satisfactory mandibular anesthesia for dental procedures. However, it has the highest frequency of clinical failures ranging from 15-81%.^{1,2} IANB failure rates for mandibular first and second molars range from 15% - 41%,^{3,4,5} 42% in second premolars, 38% in first premolars, 46% in canines and 81% in lateral incisors.³ Higher failure rates for anterior teeth may be explained by the central core theory.⁶

Reasons for failure of IANB include poor technique i.e. administration of local anesthesia at an incorrect site, decreased amount of local anesthesia administered, expired local anesthesia, anatomical variations, presence of inflammation, psychogenic reasons and possibly increased tolerance due to intoxicant abuse or smoking.^{7,8,9}

If satisfactory local anesthesia is not achieved within 3 to 53 minutes of administration of an IANB,

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most general practitioners tend to repeat the nerve block. Although repetition is effective in most cases,¹⁰ repeated injections in the same area may lead to post injection pain and trismus, and may encounter anatomical variations in nerve course. Alternatives to conventional IANB may be useful in this situation. The 2 most commonly used alternatives are Intraligamentary injections and Gow-Gates technique.³

The Gow-Gates technique¹¹ has been reported to have a higher success rate than the conventional inferior alveolar nerve block when used by experienced operators.^{3,4} The Vazirani-Akinosi^{3,12} technique is not superior to the standard inferior alveolar injection,¹³⁻¹⁶ but is invaluable in cases of limited mouth opening for which there is no satisfactory alternative technique. Labial or lingual infiltration injections of a lidocaine solution alone are not effective for pulpal anesthesia in mandibular teeth¹⁷⁻¹⁹ but infiltrations may be effective if given as a supplement to the IANB, or alone when 4% articaine is used.²⁰ The frequency of use of these alternative techniques for achieving mandibular anesthesia is not known.

This study was undertaken to document initial and supplemental local anesthesia techniques that dental practitioners of Lahore prefer in their practices to achieve mandibular molars anesthesia for general dental procedures like fillings, root canals and extractions.

METHODOLOGY

Approval for this descriptive survey of general dental practitioners was taken from the ethical re-

view board of the Institute of Dentistry, CMH, Lahore Medical College. A questionnaire was designed and piloted on 10 dental house officers of the institute. The questionnaire was modified and administered to general dental practitioners of Lahore from June 2016 to August 2016, via pharmaceutical representatives who visits dental clinics to collect it back. There was no conflict of interest. The questionnaire was collected on same day, or one week later.

Data were analyzed using SPSS version 23 (IBM SPSS Statistics, version 23, USA). Chi square test was used to compare frequencies amongst groups. A p value of <0.05 was set as the level for statistical significance.

RESULTS

A total of 160 dental practitioners responded to the survey. Response rate was 59%. There were 85 (53.1%) male respondents and 75 (46.9%) female respondents and the male to female ratio is 1.1:1, with 126 (78.8%) (Table 1). The year of graduation of respondents ranged from 1994-2016 with increasing number of graduates in the year 2015 and 2016 (Fig 1).

There were 107 valid responses for the choice of primary LA technique for mandibular anaesthesia, as 53

TABLE 1: DESIGNATION AND GENDER DISTRIBUTION OF STUDY PARTICIPANTS

Respondents	Number (n)	Gender (%)	
		Male	Female
General dentists	126	49.2 (n=62)	50.8 (n=64)
Specialists	34	67.6 (n=23)	32.4 (n=11)
Total	160	53.1 (n=85)	46.9 (n=75)

respondents selected more than one primary technique. IANB was used by 96.3% (n=103/107) participants as a primary technique. (Table 2) Significantly more general dentists (98.9%) used IANB as a primary local anesthesia technique compared to specialists (83.3%, p= 0.006, Table 2).

There were 119 valid responses for the question on supplemental local anesthesia, and Intraligamentary was most frequently used technique (37.8%, Table 2). While comparing results between general dentists and specialists for supplemental LA technique, significant (p=0.045) differences existed in the choice of technique. Specialists used IANB and intraligamentary more frequently, while general dentists used infiltration more frequently as a supplemental technique (Table 2).

Comparing training received by general dentists and specialists in local anesthesia techniques, Training had been received for IANB by 81.8% (n=131), for Gow-Gates by 16.3% (n=26), for Vazirani Akinosi by 8.1% (n=13), for intraligamentary by 51.3% (n=82) and for infiltration by 65%. An apparent difference in Gow-Gates training between general dentists and specialists was found to be non-significant (p=0.195, Table 2).

DISCUSSION

IANB has been the mainstay for mandibular local anesthesia and it comes as no surprise that it was the most favoured (96%) primary local anesthesia technique among respondents in this study. It may be kept in mind that 53 (33.1%) participants selected more than one primary technique, possibly indicating preference for use of multiple techniques.

Unfortunately IANB has high failure rates (15% to 20%),³ and needs to be supplemented frequently. Higher success rates have been reported for Gow-Gates as a

TABLE 2: CHOICE OF PRIMARY AND SECONDARY LA TECHNIQUE, AND TRAINING RECEIVED ACCORDING TO DESIGNATION

LA technique	Primary LA technique (%)			Secondary LA technique			Training received (%)		
	General dentists	Specialists	Total	General dentists	Specialists	Total	General dentists	Specialists	Total
IANB	n=89	n=18	n=107	n=96	n=23	n=119	n=126	n=34	n=160
	98.9	83.8	96.3	21.9	39.1	25.2	81.7	82.4	81.8
	n=88	n=15	n=103	n=21	n=9	n=30	n=103	n=28	n=131
Gow-Gates				14.6	8.7	13.4	14.3	23.5	16.3
				n=14	n=2	n=16	n=18	n=8	n=26
Vazirani	1.1	0	0.9	2.1	0	1.7	7.1	11.8	8.1
Akinosi	n=1	n=0	n=1	n=2	n=0	n=2	n=9	n=4	n=13
Intraligamentary	0	5.6	0.9	36.5	43.5	37.8	50.8	52.9	51.3
	n=0	n=1	n=1	n=35	n=10	n=45	n=64	n=18	n=82
Infiltration	0	5.6	0.9	25	4.3	21.0	65.9	61.8	65.0
	n=0	n=1	n=1	n=24	n=1	n=25	n=83	n=21	n=104
Other	0	5.6	0.9	0	4.3	0.8			
		n=1	n=1	n=0	n=1	n=1			

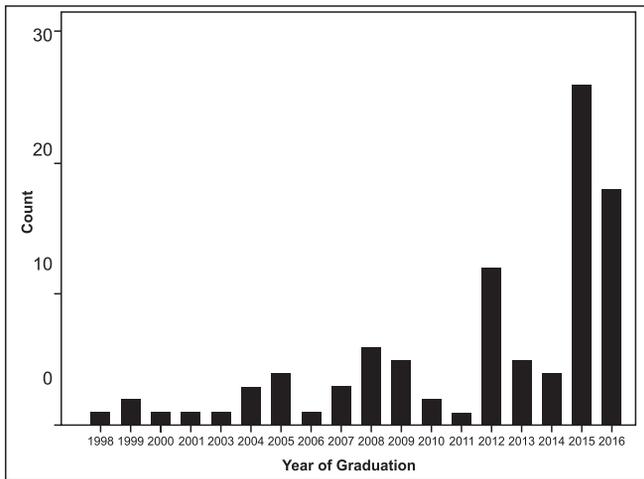


Fig 1: The year of graduation of respondents

primary technique,^{21,22} but no dentists in our sample were using Gow-Gates as a primary technique, and few had received training for it (Table 2).

The frequency of positive aspiration in Gow-Gates is lower than IANB, though a higher dose (3ml) has been recommended by Malamed.^{3,4,11,23} Clinicians need to decide what is safe for their patients, and in cases of failure of IANB, or when inadvertent intra-vascular local anesthesia administration may cause significant medical problems, e.g. unstable angina or cardiac arrhythmias, Gow-Gates or a more distal administration as Intraligamentary injection may be indicated because incidence of positive aspiration in inferior alveolar nerve block is relatively high.³³

Vazirani Akinosi technique, which is a closed mouth technique, may be used as a primary technique because of its ease of administration in patients with reduced ability to open their mouth due to muscle trismus, infection, or the presence of tumor.³ It may also be used as a secondary local anesthesia technique if the conventional block anesthesia fails.⁹ Lack of training in Gow-Gates and Vazirani Akinosi techniques highlights the need to practice these techniques more at undergraduate level.³⁴

Infiltration may be useful as a primary technique for mandibular anterior region where bone is more porous and allows local anesthesia to diffuse in. The central core theory⁶ tries to explain the higher failure rates of IANB in the anterior region, and supports the use of infiltration as a primary technique for teeth in this area. Success rates of infiltration in this area are high, though 4% articaine may be more effective than 2% lidocaine as a primary or supplementary infiltration technique.²⁴⁻²⁶ Intraligamentary is an invaluable supplemental local anesthesia technique, and was being used frequently for this purpose by respondents. It may also be used as a primary technique for mandibular local anesthesia, though there are concerns about periodontal ligament injury with injecting large amounts for restorative reasons.²⁷ Higher success rates for restorative procedures have been reported for intraligamentary injections when compared to the inferior alveolar nerve block, even

though intraligamentary infiltration may need to be supplemented during procedures.²⁸ Intraligamentary injections are also technique sensitive, and may require special armamentarium to administer effectively, though equal success rates (50% to 96%) have been demonstrated when comparing different needles and equipment for Intraligamentary injections.^{3,27-30}

The choice of supplemental local anesthesia technique should ideally be based on the reason for failure of the primary local anesthesia technique. Error in technique is the most common reason for failure of IANB. Repeating the IANB may be most useful in this case. The larger quantity of local anesthesia deposited near the inferior alveolar nerve is also likely to diffuse and contact 1 cm of the nerve, which will ensure blockage of 3 nodes of Ranvier³ required to completely block nerve transmission in myelinated A-delta fibres which carry pricking pain, temperature and firm touch sensations.³

Where infection may be the reason for failure of primary local anesthesia technique, it may be preferable to administer the supplemental local anesthesia more proximal (repeat IANB or Gow-gates) or distal (e.g. intraligamentary) to the site of infection. Similar strategy may be useful in cases of anatomical variations, when both proximal (Gow-Gates) and distal (intraligamentary) techniques may be useful.

Intraosseous LA has gone out of favour and has been superseded by Intraligamentary injections. Intraosseous was an effective primary³¹ or secondary technique, but required special equipment (bur, needle) to drill into bone and administer distal to the concerned tooth.³² The equipment should be available, and dentists trained in the use, for cases where other techniques have failed, or for use during surgical extractions.

CONCLUSION

Most of the dental practitioners of Lahore used IANB as a primary local anesthesia technique and intraligamentary injections as a supplemental local anesthesia technique in their practices to achieve mandibular molars anesthesia for general dental procedures like fillings, root canals and extractions.

RECOMMENDATIONS

Lack of training in alternative local anesthesia techniques like Gow Gates and Vazirini Akinosi was identified so these techniques should be practiced more at undergraduate level and during house job (internship).

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| 1 M Shairaz Sadiq: | Principal author, collected data |
| 2 Shifa Ahmed: | Data analysis and wrote article |
| 3 Samir Qazi: | Designed study, article review |