Original Article

VOLUME OF 2% LIDOCAINE ADMINISTERED BY OPERATORS PER PATIENT FOR EFFECTIVE INFERIOR ALVEOLAR NERVE BLOCK

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ABSTRACT

Objective: *The purpose of this was to evaluate the volume of 2% lidocaine with adrenaline 1:100,000 administered per patient for effective inferior alveolar nerve block with special focus on influence of technique of the operator.*

Materials and Methods: *The study was carried out at Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry Peshawar, from December 2012 to March 2013. One hundred patients were included in this study. For the collection of data, specially designed proforma was used. A 27 gauge 42mm long needle, 2% lidocaine with 1:100,000 adrenaline and conventional inferior alveolar block technique was used in the study. The collected data was analyzed by Statistical Package for Social Sciences (SPSS) version 17.*

Results: *The gender distribution revealed that out of 100 patients 60(60.0%) were males while 40(40.0 %) were females, mostly in age group 21-30 years (34.0%). The age ranged from 14 to 65 years. The success rate for graduate operators was 83.78% while for undergraduate operators was 69.84% with a P-value 0.158.*

Conclusion: *Knowledge of surgical anatomy and experience of operator are most important for successful inferior alveolar nerve block.*

Key words: *Lidocaine, Inferior alveolar nerve block, Oral Surgery.*

INTRODUCTION

A thorough knowledge of anatomy is crucial in providing predictable, safe, and effective mandibular anaesthesia[1].

Direct Inferior alveolar nerve block (IANB) is a technique of choice for anaesthesia of mandibular teeth, lingual gingival tissues, and lower lip[2]. Knowledge of the relationship of mandibular foramen to internal oblique ridge carries great importance in this technique[3,4]. However, this conventional technique is associated with some risks and complications such as neural or vascular injury and intravascular injection[5].

Many other techniques are used for anesthetizing inferior alveolar nerve. Some of them are; Indirect IANB, Anterior injection technique, Gow-Gates mandibular block technique and Akinosi closed-mouth technique. In the Indirect technique[6] the level and site of injection is the same. It involves the insertion of the needle coming from the opposite premolars to indicate the correct height and mediolateral needle placement but with a significantly greater degree of syringe angulation on the contralateral side. The anterior injection technique[7] involves insertion of the needle for approximately 10mm into the pterygomandibular space where the local anaesthetic is deposited, allowing for the anaesthetic solution to slowly diffuse across the space and toward the IAN. Gow-Gates technique[8] involves the intraoral insertion of a needle through the pterygomandibular space until bony contact is made with the anterolateral condylar neck, under the insertion of the lateral pterygoid muscle. The height of injection is established by the mesiopalatal cusp of the maxillary second molar, the site of injection is the tissue immediately distal to the maxillary second molar (or maxillary third molar if present). The angulation of the syringe in the mediolateral plate involves the barrel of the syringe being approximately

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in the corner of the mouth, over the contralateral premolars while the orientation of the syringe in the vertical plane requires the alignment of the syringe with the plane that extends between the lower border of the tragus, in the intertragic notch, and the corner of the mouth. Akinosi closed-mouth technique[9] involves injection at level of the mucogingival junction of the maxillary second molar or third molar while the mouth is fully closed. This technique does not involve bony contact, where the desired location of the needle tip should be in the loose areolar tissue medial to the mandibular ramus.

Multiple factors contribute to success and failure of IANB[10]. Some of the factors are patient-dependent like anatomical, pathological or psychological while other are operator-dependent including technique.[11] Amongst all these factors, experience of operators is the most significant[12].

Desantis and Liebow[13] described four anatomical variations of mandibular nerve that may complicate the local anesthesia, namely the accessory mylohoid nerve, bifid mandibular nerve, presence of retromolar foramen and contralateral innervation of anterior teeth. Effective inferior alveolar nerve block can be achieved in most cases by properly locating anatomical landmarks with single cartridge (1.8ml, 2% lidocaine with 1:100,000 epinephrine)[14,15].

The objective of this study was to evaluate the volume of 2% lidocaine with 1:100,000 epinephrine used for effective IANB in patients by undergraduate and graduate operators.

MATERIALS AND METHODS

The present study was carried out at department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar from December 2012 to March 2013. A total of 100 patients for inferior alveolar nerve block were included in the study. A written approval was obtained from Institutional Ethical Review Committee. All the patients were included in the study except the medically compromised or drug-addicts. After informed consent, detailed history was taken from each patient on specifically designed proforma. Age, gender, medical condition, body weight and localized infection were recorded. Localized infection was diagnosed on clinical and radiographic examination. The operators were divided into two groups, Graduates (Trainee Medical Officers and House Officers) and Undergraduates (Final and 3rd year students).

A 27 gauge, 42mm long needle was used. The anesthetic used in all cases was lidocaine 2% with adrenaline 1:100,000. The conventional inferior alveolar nerve block technique (also known as indirect IANB technique) was used. The maximum concavity of Coronoid notch on anterior surface of the ramus of mandible was palpated with thumb, as well as the maximum concavity of posterior border of ramus, extraorally, with index finger. The needle was inserted into the tissues at the back of mouth 10mm above the lower occlusal plane when the mouth was fully open, just medial to the anterior border of ramus of the mandible at a level halfway up the thumb, which was palpating the coronoid notch. The barrel of the syringe was parallel to the occlusal plane of lower teeth while it came from opposite premolars. The buccal mucosa was retracted, a crescent-shaped depression was formed between pterygomandibular raphe and medial border of the ramus. Needle was inserted into the crescent shaped area, at a depth of 1 cm, a few drops were injected to anesthetize the lingual nerve and then went deeply until bone was touched gently. Slight retraction of needle was required before remaining solution in the cartridge was injected there.

The criteria for recording a successful inferior alveolar nerve block was that labial mucosa between lower lateral incisor and canine teeth, on the affected side, was sufficiently anesthetized to allow firm periodontal probing with a sharp explorer. Only one cartridge of anesthetic was allowed and no buccal infiltration anesthetic was used until the probing test was successful. Another category for failure was when the patient showed signs of discomfort during dental procedure, despite successful probing and effective buccal infiltration.

The success and failure rates of IANB by graduate and undergraduate operators was analyzed by Statistical Package for Social Sciences (SPSS) version 17 using the Pearson chi-square test with significance value of < 0.05.

RESULTS

A total of 100 patients were included in this study. Sixty patients were male (60%) and 40 were fe-

male (40%). The male to female ratio was 1.5:1. Their ages ranged from 14 to 65 years with a mean of 34.02 ± 12 .39 years. The most common age group was third decade (34.0%) followed by 4th decade (23.0%). The details of age distribution are given in Table-1. The patients who were administered local anesthesia for IANB, it was effective in 75% cases. Higher success rate was recorded for House officers 84% and Final year students 80% while lowest for the 3rd year students. The details are given in Table-2. Similarly higher success rate was recorded for graduates as compared to the undergraduates. However this difference was statistically not significant (P = 0.158). The details are given in Table-3.

In 25 patients, the administered local anesthesia failed to produce IANB. The cause of failure in 80% was improper technique, while in 20% was periapical infection.

DISCUSSION

The higher success rate of IDB by the most experienced dentist is not unexpected. An established practitioner may have a large group of patients who place increased trust in their dentist, having built a relationship over a number of years. However it is unlikely that this would extend to the patient continuing with surgery or extractions if analgesia is not successful[16].

This study shows that the experience of the operators was the most important factor in success and failure of IANB. Success of IANB with house officers & post-graduates was better and these findings are consistent with the findings of Paul et al[17]. Successful anesthesia is technique-sensitive and there are few studies that addressed the effect of practitioners experience in inferior alveolar nerve block[18,19].

In the present study, experience of the operator and infection were the most commonly associated factors for failure of IANB, although failures due to infection were implicated in few cases (6%). In the present study non-aspirating syringes were used and the operators from different groups were not equal in number. Similar results were reported in studies carried out by Meechan[11], Mathews et al[12], Keetly and David[19], Kaufman et al[20] and Wong and Jacobson[21]. However, contrary to our study, they used aspirating syringes and other techniques of anesthesia like Gow-Gates and Vazirani-Akinosi in their studies as well.

Lenton et al[22] found statistically significant difference in the success rate of IANB amongst the dental practitioners on basis of experience (P=0.148) which is in accordance with our study (p=0.158). Jason and Wong[23] found that 31% failure rate of IANB was due to poor technique of operators. In our study there was 30.15% failure rate for undergraduate students and 16.21% for graduates, mostly, due to poor technique.

Jehad[24] recently carried out a study on operator's experience and success rate of inferior alveolar block in Pakistan in 2013. They recorded data from different practitioners of various specialities of dentistry ranging in experience from 2 years to 19 years. Most of them were specialists in endodontics, periodontics and oral surgery. The results showed that 93.6% of the local anesthetic administrations were successful. Success rate of this study is higher than our study, but in our study most of the operators had much less experience.

Table 1: Age Distribution

Age in years	n	%
11-20	15	15
21-30	34	34
31-40	23	23
41-50	18	18
51-60	7	7
61-65	3	3
Total	**100**	**100**

Table 2: Success rate of IANB

Operator	Patients given IANB (n)	Successful IANB		Failed IANB		Total
		n	%	n	%	
3rd Year Students	28	16	57.4	12	42.6	100
Final Year Students	35	28	80.0	7	20	100
House Officers	32	27	84.0	5	16	100
TMOs	5	4	80.0	1	20	100

Table 3: Comparison of success and failure among graduates and undergraduates

Operator	Success ful		Failed		Total no. of patients	P-value
	n	%	n	%		
Under Graduates	44	69.84	19	30.15	63	0.158
Graduates	31	83.78	6	16.21	37	

The poor results for undergraduates as compared to graduate surgeons, emphasizes the need to improve the skill and knowledge for success of IANB and for better patient's care.

CONCLUSION

From this study it is concluded that:

1. Knowledge of surgical anatomy, along with its variations, proved to be essential for the success of IANB.
2. More experienced and skilled operators produced more effective IANB.

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