

Dental Students' Perception and Anxiety Levels during their First Local Anesthetic Injection

Balamanikandasrinivasan CHANDRASEKARAN¹, Navaneetha CUGATI², Ramesh KUMARESAN¹

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¹ Academic Unit of Craniofacial Clinical Care, Faculty of Dentistry, AIMST University, 08100, Jalan Bedong, Semeling Kedah, Malaysia

² Academic Unit of Primary and Preventive dentistry, Faculty of Dentistry, AIMST University, 08100, Jalan Bedong, Semeling, Kedah, Malaysia

Abstract

Background: Student-to-student administration of local anesthesia (LA) has been widely used as the teaching modality to train preclinical dental students. However, studies assessing students' outlook towards their first injection were limited. Therefore, this study aims to evaluate students' perception and anxiety levels towards their first LA injection.

Methods: Sixty three pre-clinical dental students swapped their roles as both operator and respondents in relation to their first supraperiosteal injection. After being injected, the students conferred their opinion and experiences to the questionnaire based on the five point Likert's scale and indicated their anxiety levels based on the Interval Scale of Anxiety response (ISAR). Their perception was described using frequencies and percentages and anxiety levels were statistically analysed using one way analysis variance and paired *t* test.

Results: Students learning LA techniques directly on human subjects depicted not only greater confidence in them but also increased anxiety levels. The anxiety levels were found to be high before and during injection in both operator and respondent.

Conclusion: The students' preferred the use of preclinical models rather than student to student administration for their first LA injection exercise. Based on the results obtained, we recommend the need of preclinical simulation model in LA training program.

Keywords: dental anxiety, local anesthesia, maxillary infiltration

Introduction

Achieving absolute anesthesia is a vital element in clinical dental practice. It enables painless treatment, so that the subject is placed at maximal comfort and also allows the dentist to undertake the procedure with precision (1). Administering local anesthesia (LA) is technique sensitive process and needs meticulous skills and mastery over the maneuver (2). The expertise for this dexterity begins in the undergraduate dental school. Teaching LA at the undergraduate level continues to be a challenge for both the trainer and trainee (3). There are various methods for teaching LA, which includes demonstration on cadavers and dry human skull, practice on simulation models and live human subjects (4-6). Among these, student to student LA administration is most often practiced in dental schools across the globe and continues to be the standard teaching modality (7,8).

When such a procedure that may predictably lead to physical damage is performed on a patient, a considerable degree of anxiety is anticipated in both operator and the recipient (9). While students are involved in a similar training process, their anxiety level may aggravate proportionally. Perhaps, pre-acquired knowledge about the anatomical structures, coupled with conception of the exercise would prepare them sufficiently. Yet, it is a challenging act in the dental curricula to confront the first LA injection exercise which is often dominated by various psychosocial variables. Learning the technique of LA administration and the changeover phenomenon to receive the same from an untrained individual is foreseen with marked grade of emotional and physiological responses (10,11).

Literature reveals that LA teaching program shows considerable variation globally. In spite

of this, student to student administration of LA remains the most popular practice and historically considered to be a rite in many dental schools (7,8,12). Unlike dental schools of Italy, Slovenia, India, Romania, and Turkey, where students administer their first injection on patients, most of dental schools of North Europe and United States train their students to do their first injection on each other (8,12). In our institution we follow student to student administration to teach LA techniques. Perhaps with the knowledge obtained only from the didactic lectures and video demonstrations and with no practical experience, giving a first LA injection to their colleagues will be a demanding task (9). As the students have only theoretical knowledge, we hypothesised that the students involved in their first LA suprapariosteal injection were expected to exhibit less confidence and more anxiety levels.

Therefore, this study was done with the objective of analysing the year three dental students' perception towards their first LA injection and to assess their anxiety levels as both operators and recipients.

Materials and Methods

Ethical clearance was obtained from the institution review board and the study was conducted with sixty-three (20 male, 43 female), third-year pre-clinical dental students of Asian Institute of Medicine, Science and Technology [AIMST] University, during the academic year of 2011–2012. Their age ranged from 19 to 23 years with a mean age of 21. All the students were explained about the study procedure and their consent was obtained. They attended regular lectures which comprised anatomical, medical and pharmacological aspects of LA including a video demonstration of suprapariosteal LA injection, before the practical exercise.

The students were categorised into eight groups with eight students in each except the last group which consisted of only seven students. Every student had to exchange their roles as operator and recipient. None of them had previous experience in LA as both operator and respondent. They were supervised by one of the investigators during exercise in preclinical lab. First four students of every group were categorised as an "Operator", whereas the other four were 'recipients'. To standardise the procedure all students were instructed to administer LA injection in relation to maxillary left first premolar. 0.5 mL of 2 % lignocaine with

1:80000 epinephrine was used as the LA agent and the whole procedure was repeated in same manner with the other four students.

In order to evaluate the dental student's perception towards their first LA injection, they were asked to indicate their level of agreement on given statements based on the five-point Likert's scale (1-totally disagree, 2-partially disagree, 3- neither agree/nor disagree, 4-partially agree, 5-totally agree) after the administration of LA. Besides this, their anxiety response was also measured before, during and after the administration of LA based on seven descriptors as follows: calm and relaxed, a little nervous, tense and upset, afraid, very afraid, panicked, terrified (13,14).

The data was collected and entered in Microsoft Excel spreadsheet. The statistical analysis was performed through SPSS version 13.0. The categorical data involving operators' opinion, respondents' response and the anxiety levels of students were analysed. The perception was described using frequencies and percentages. For comparison of mean anxiety levels within the operator and respondent groups before, during and after injection- one way analysis variance was done. The anxiety scores between pairs (before vs during, before vs after, during vs after) within the operator and respondent groups were analysed separately using paired t test. The level of significance was set to $P < 0.05$ (2-sided).

Results

The opinions of the operators towards their first LA injection technique were summarised in Table 1. The results illustrate that only 39.7% of the operators could make the patient comfortable during the procedure. But 57.1% of the students neither agreed nor disagreed with this statement. 42.9% had difficulty in determining the insertion point, though 33.3% of the students totally agreed that their hands didn't shiver while giving the injection. Majority of the operators (42.9%) felt that they needed supervision in the forthcoming injection procedures also. 65% of students were unable to decide whether consent is mandatory for student to student LA administration. However 46.1% of the students preferred simulation models for the first LA injection exercise.

Table 2, projects the respondents' response to the questionnaire. Though greater part of the respondents (69.8%) were not sure whether the operator was reassuring and gentle, 52.4% agreed that their dentist (operator) was confident.

Table 1: Operators opinion for their first maxillary supraperiosteal injection

Questionnaire	Frequency (%)				
	1 (totally disagree)	2 (partially disagree)	3 (neither agree/ nor disagree)	4 (partially agree)	5 (totally agree)
The patient* was comfortable	1 (1.6)	1 (1.6)	36 (57.1)	0 (0)	25 (39.7)
Hands didn't shiver while giving injection	9 (14.3)	17 (27)	16 (25.4)	0 (0)	21 (33.3)
Point of insertion was difficult to determine	13 (20.6)	20 (31.7)	2 (3.2)	1 (1.6)	27 (42.9)
No need supervision next time	27 (42.9)	22 (34.9)	1 (1.6)	2 (3.2)	11 (17.4)
Receiving informed consent from my colleagues would be appreciable	2 (3.2)	3 (4.8)	41 (65)	2 (3.2)	15 (23.8)
Simulations (with Model/cadaver) are preferred for first injection administration exercise	12 (19)	8 (12.7)	14 (22.2)	0 (0)	29 (46.1)

*Respondent.

Table 2: Respondents response for their first maxillary supraperiosteal injection

Questionnaire	Frequency (%)				
	1 (totally disagree)	2 (partially disagree)	3 (neither agree/ nor disagree)	4 (partially agree)	5 (totally agree)
The dentist was confident	1 (1.6)	1 (1.6)	28 (44.4)	0 (0)	33 (52.4)
The dentist was gentle and reassuring	0 (0)	1 (1.6)	44 (69.8)	0 (0)	18 (28.6)
Needle insertion was painful	26 (41.2)	16 (25.4)	3 (4.8)	0 (0)	18 (28.6)
Felt pain during injection of local anesthesia	22 (34.9)	17 (27)	1 (1.6)	1 (1.6)	22 (34.9)
Felt paresthesia in the expected region	6 (9.5)	3 (4.8)	46 (73)	0 (0)	8 (12.7)
I want to be a part of this exercise further	29 (46.1)	24 (38.1)	4 (6.3)	2 (3.2)	4 (6.3)
First injection exercise on human models help to prepare for the demands in general practice	3 (4.8)	4 (6.3)	42 (66.7)	0 (0)	14 (22.2)

41.2% of students felt that the needle insertion was not painful, however there was mixed a response towards pain during LA deposition. 46.1% of the respondents did not want to be a part of this exercise further. 73% could not determine paraesthesia after injection and 66.7% were not sure in their opinion whether first injection will prepare them for the demands in general practice.

Table 3 illustrates the anxiety levels of the participants throughout the LA exercise. It was revealed that as operators 46% of students were “a little nervous” before and during the injection procedure and 57.1% of them become calm and

relaxed after the procedure. As respondents the highest level of anxiety (50.8%) was observed receiving the LA injection and majority of them became relaxed (81%) post-injection.

Comparison of anxiety levels (before-during, during-after, before-after giving injections) within the operator and respondent group was presented in Table 4. The mean difference and their standard deviation (SD) between pairs were showed in Table 5. No significant difference in anxiety levels were found in the comparison between before and during injection in both operator and respondent groups whereas significant differences were

Table 3: Anxiety responses of operator and respondent during administration of local anesthesia

Anxiety level (measured through ISAR scale)		Frequencies (%)						
		Calm & relaxed	A little nervous	Tense & upset	Afraid	Very afraid	Panicked	Terrified
Operator (n = 63)	Before injection	13 (20.6)	29 (46)	4 (6.3)	10 (15.9)	1 (1.6)	3 (4.8)	3 (4.8)
	During injection	8 (12.7)	29 (46)	10 (15.9)	6 (9.5)	3 (4.8)	5 (7.9)	2 (3.2)
	After injection	36 (57.1)	25 (39.7)	2 (3.2)	0 (0)	0 (0)	0 (0)	0 (0)
Respondent (n = 63)	Before injection	22 (34.9)	20 (31.7)	6 (9.5)	8 (12.7)	2 (3.2)	2 (3.2)	3 (4.8)
	During injection	13 (20.6)	32 (50.8)	5 (7.9)	10 (15.9)	0 (0)	1 (1.6)	2 (3.2)
	After injection	51 (81)	11 (17.4)	0 (0)	0 (0)	0 (0)	1 (1.6)	0 (0)

Table 4: Anxiety responses of operator and respondent before, during and after injection*

Anxiety levels		Anxiety response Mean (SD)	P value
Operator (n = 63)	Before injection	2.65 (1.61)	< 0.001
	During injection	2.84 (1.57)	
	After injection	1.46 (0.562)	
Respondent (n = 63)	Before injection	2.46 (1.66)	< 0.001
	During injection	2.41 (1.35)	
	After injection	1.25 (0.71)	

*One-way anova.

Table 5: The mean difference for anxiety response scores between pairs

Anxiety Response		Anxiety Response	Mean paired Difference (SD)	P value
Operator (n = 63)	Before injection	During injection	-0.190 (1.58)	0.344
	Before injection	After injection	1.190 (1.55)	< 0.001
	During injection	After injection	1.380 (1.31)	< 0.001
Respondent (n = 63)	Before injection	During injection	0.047 (0.99)	0.704
	Before injection	After injection	1.206 (1.42)	< 0.001
	During injection	After injection	1.158 (1.12)	< 0.001

observed in anxiety levels when compared between before and after injection, during and after injection in operators and respondents. The anxiety levels were found to be higher before and during injection and significantly reduced after the procedure in both operators and respondents ($P < 0.05$).

Discussion

The results of this study revealed the student's outlook towards the first injection on their colleagues and their anxiety levels. Accomplishment of adequate anesthesia through efficient LA administration forms the basis of painless dentistry. Therefore comprehensive knowledge on anesthetics and the ability to deliver injection meticulously are the important aspects in the dental curriculum (2,4,8). The ability to administer LA confidently involves sound background knowledge about the regional anatomy, anesthetic drug, the procedure involved, complications, and its management. However, injection of LA still remains a complex task for the students when they perform for the first time (3).

Being one of the basic and less invasive techniques in LA training, suprapariosteal injection was considered for our study. The students were guided during every step of their performance. Questionnaire regarding opinion and anxiety levels of students through various stages of LA exercise were marked after completion of the procedure.

The Operator's confidence in handling the armamentarium was found to be high which was in concordance with Meechan et al., This may be due to their familiarity in instrumentation obtained through pre-procedural demonstration(9). Though the respondents found their operators confident while performing the procedure- they failed to reassure the patient during the process. This indicates that the operator's orientation was more towards the technical aspect than the communicative component.

High proportion of the operators revealed the difficulty in locating the point of insertion substantiated the results of Brand et al., which stated that the anatomical knowledge is one of the areas where students were insufficiently prepared and hence majority of our students requested for further supervision during administration of LA (8).

In a study Brand et al., found that students trained prior in training models were more confidence than the students who lacked it, though

the prior training on the models did not have any effect on pain perception in the recipient (4). Our study also confirmed that most of the students do not want to be a part of this exercise further. The students preferred training on simulation models prior to clinical LA administration, which statistically showed higher significance. This reflects that the use of simulations models would have increased their confidence level further (8,15). Most of the recipients expressed their difficulty in feeling the paresthesia. This may be because of lack of previous experience to LA injection.

Pain during injection depends on many elements. Among those, the rate at which the solution is deposited remains the most significant factor (16). Studies have shown that slow deposition of LA and constant reassurance of the patient would make the injection technique more comfortable. In our study, though most of the respondents expressed the needle penetration as painless, mixed response was received regarding the pain during deposition of the solution. As this was the first injection for the operators, they would have experienced difficulty in assessing the rate of injection, leading to inconsistent rate of LA deposition, therefore resulting in pain.

When an adverse outcome occurs, possibility of litigation can be avoided by obtaining informed consent (12,17). Though student to student LA administration has been considered as a part of dental education program, controversies still exists regarding obtaining informed consent, which is reflected in our study as well (7,18). In contrast with Mehran et al., statement that informed consent should be obtained before student to student LA exercise, majority of the respondent in our study neither agree nor disagree for obtaining informed consent before the exercise (2).

Greater impacts were seen in dental practice due to anxiety and injection of local anesthesia (11). Delivery of local anesthesia gives stress not only to the recipient, but to the operator as well. Since the ability to handle anxiety varies from one student to other, its estimation also differed.

Anxiety is known to have a major impact in both the operator and the recipient in clinical practice (19). Dental injections may elucidate anxiety even among the well- educated people and those who seek regular dental care. Anxiety levels may vary during the different stages of LA injection procedure which can be assessed using different anxiety scale (9,20). In our study 46% of the operators were found to be reasonably nervous

before and during the injection procedure. 34.9% of the recipients were calm and relaxed before the procedure, but their anxiety level significantly increased during the injection procedure (50.8%). This may be due to the fact that both the operator and the recipient were aware of their inexperience in the procedure. However majority of the students (81%) were calm and relaxed after the procedure. The anxiety level was significantly high before the injection procedure, which increased further during the injection and considerably reduced after the procedure in both operators and respondents. This concludes that theoretical knowledge coupled with step by step practical guidance though reduces anxiety during the injection procedure; the awareness of their inexperience instill a measurable level of anxiety.

Conclusion

The students' preferred the use of preclinical models rather than student to student administration for their first LA injection exercise. Their anxiety levels were found to be high in this study. Therefore based on the results obtained, the need of a pre-clinical simulation model in LA training program is recommended.

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Conflict of Interest

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Correspondence

Dr Balamanikandasrinivasan Chandrasekaran
BDS (Dr MGR University, India), MDS (Meenakshi University, India)
Academic Unit of Craniofacial Clinical Care
Faculty of Dentistry
AIMST University
08100, Jalan Bedong
Semeling, Kedah
Malaysia
Tel: +60164-326604
Fax: +04-4298009
Email: drbalamanikanda@gmail.com

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