



ORIGINAL ARTICLE

Challenges faced by final year dental students and house officers while performing endodontic treatment.

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ABSTRACT... Objective: To identify the challenges faced by final year dental students and house officers while performing endodontic treatment. **Study Design:** Cross sectional study. **Setting:** Multicenter study. **Setting:** Involving Dental Colleges of Twin Cities Dental Hospitals of Islamabad and Rawalpindi including Islamabad Dental Hospital, Islamic International Dental Hospital, Pakistan Institute of Medical Sciences, Armed Forces Institute of Dentistry, Rawal Institute of Health Sciences and Margalla Institute of Health Sciences. **Period:** June 2023 to December 2023. **Methods:** This cross sectional descriptive study was conducted on 263 participants. The inclusion criteria was final year dental students and house officers who had completed their mandatory rotation in endodontics department and performed root canal treatment with conventional methods. A structured questionnaire consisting of five sections containing patient management, access opening, working length determination, cleaning and shaping procedure and obturation was constructed. Google forms were sent to the participants after sample size was calculated with WHO calculator. Data was analyzed through Google forms. **Results:** The current study shows that majority of the participants faced difficulties in the patient management and obturation procedure. The overall most common difficulty encountered was rubber dam application (44.1%) followed by accessory GP bending during obturation (42%), apex locator use (39.4%), and canal orifice location (39.8%). **Conclusion:** The students and house officers are facing multiple difficulties in performing root canal treatment independently. Therefore there is a need to focus more on the training of students and house officers in their endodontic department rotation.

Key words: Dental Students, Endodontics, Root Canal Obturation, Root Canal Preparation.

INTRODUCTION

Dentistry is a field that requires efficiency, hard work and persistence to achieve clinical excellence. Endodontics is widely known to be the most challenging field amongst all the branches of dentistry due to its variations and extensive procedures.¹ Successful endodontic treatment requires consideration of multiple factors such as a proper case selection, appropriate access cavity preparation and chemo-mechanical debridement along with achieving an adequate hermetic seal for each anatomically different tooth.²

All these considerations make endodontics an extensive and diverse specialty requiring the clinician to exhibit theoretical and clinical expertise, which takes years of learning and

practice. Therefore, at the beginning of the dental career, most of the final year dental students and house officer face uncertainty and stress of dealing with endodontic cases independently.³ This leads to compromised quality of work in their early years resulting in many patient reporting back to the department with periradicular diseases.^{4,5} In addition to this, the treatment involves multiple steps with the success of each dependent on the preceding steps. Importance of adequate execution of each phase of treatment adds to the level of stress, the students and house officers face while performing endodontic procedures. Therefore, rigorous preclinical and clinical training is a requisite to lower the level of stress faced by students and house officers while performing endodontic treatment.^{6,7}

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Kaplan et al found that students had the most difficulty in radiography (50.9%), root canal identification (67%), and obturation (54.7%) procedures.⁸ Aliuddin et al have shown that majority of the house officers faced difficulties in the cleaning and shaping task of the endodontic procedure and most common challenge encountered by the house officers was apical perforation (51.4%) followed by loss of estimated WL (51.1%), ledge formation (40.9%), file separation (39.1%) while obturations was most commonly encountered problem (56%).¹ Qamar et al evaluated the confidence level of house officers performing endodontic treatment. Majority of house officers were not confident in rubber dam application (44%), working length determination using apex locator (36%) and management of flare-ups (40%). Males were found more confident than females regarding different steps of endodontic procedure.⁹ Javed et al have shown that students exhibited the highest confidence level for rubber dam placement (4.43 ± 0.70) while the lowest confidence was documented for managing inter-appointment flare-up (3.45 ± 0.92).^{10,11,12}

The current study was planned to identify the challenges faced by students and house officers while performing endodontic treatment. This may help to modify preclinical and clinical training with emphasis to address the challenges and in turn improve the quality of treatment for patients undergoing root canal therapy by final year dental students and house officers.

METHODS

This cross sectional study was conducted from 16th June 2023 to 20th December 2023 at the dental hospitals of Islamabad and Rawalpindi including Islamabad Dental Hospital, Islamic International Dental Hospital, Pakistan Institute of Medical Sciences, Armed Forces Institute of Dentistry, Rawal Institute of Health Sciences and Margalla Institute of Health Sciences.

A sample size of 263 was determined using WHO sample size calculator with the level of confidence being 95%, absolute precision 6% and proportion of challenges faced by final year dental students

and house officers 56%.¹

After approval from the Institutional Review Board of the institutes (IMDC/DS/IRB/228), final year dental students and house officers who had completed their mandatory rotation in endodontics department and had performed endodontics with conventional methods were approached through online questionnaire using google forms. Incomplete questionnaires were excluded from the study. The prevalidated questionnaire⁵ had 31 questions in five sections regarding the challenges faced in patient management, access opening, working length determination, cleaning and shaping procedure and obturation. Each question had four options, ranging from never, rarely, occasionally and frequently. The survey was closed after 263 responses were collected. Data was analyzed through google form. Frequencies and percentages were calculated for qualitative variables such as gender, designation and the responses to the five sections of the questionnaire. Mean and standard deviation was calculated for age. Results were presented in the form of tables and charts.-

RESULTS

A total of 263 final year students and house officers participated in this research out of which 82 were male (31.2%) and 181 were females (68.8%). The age distribution showed that 77.2% are in the 21-25 year old age bracket. 64.5% of the respondents were house officers while 35.5% were final year students. Figure-1 shows the number of endodontic procedures performed by the participants.

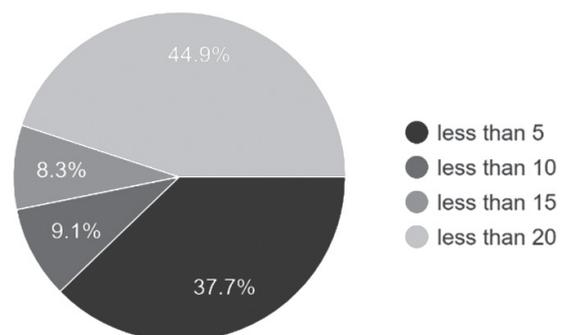


Figure 1: Number of endodontic procedures performed

Table-I shows the results in the patient management section where overall highest percentage of difficulty was observed during rubber dam application (43.8%) while local anesthesia administration was found the least challenging (3.8%). Table-II shows that during access opening, majority of the participants reported greatest difficulty in locating the canal orifices (39.2%) and adequate de roofing of the pulp chamber 37.5%. The least encountered difficulty was iatrogenic perforation 7.2%. As shown in Table-III during WL determination, the

participants faced greatest difficulty in using the apex locators (38.8%) and lowest difficulty in reaching working length (7.2%). Table-IV shows that the most difficult part of canal preparation was handling the chelating agents (7.7%) while strip perforations (4.3%) were the least encountered error. In Table-V the challenges faced in obturation are shown where most participants faced difficulties in placing the gutta percha to the correct length without bending (41.3%). Sealer placement (4.2%) was considered the least challenging.

Question		Difficulty Grading n (%)			
		Never	Rarely	Sometimes	Frequently
1	Difficulty in reaching the correct periradicular diagnosis	33(12.4)	72 (27.3)	116(44.2)	42(16.1)
2	Difficulty in pain management	34 (12.9)	95 (36.1)	120 (45.6)	14 (5.3)
3	Difficulty in administration of LA	61(23.4)	72 (27.2)	120(45.7)	10(3.8)
4	Difficulty in rubber dam application	22(8.3)	39(14.7)	56(21.5)	115(43.8)
5	Any other	Rubber dam never placed 31(11.8)			

Table-I. Difficulties faced by participants during patient management

Question		Difficulty grading n (%)			
		Never	Rarely	Sometimes	Frequently
1	Difficulty in reaching the pulp chamber?	30(11.4)	101(38.6)	112(42.4)	20(7.6)
2	Difficulty in locating the canal orifices	16(16.1)	52(19.8)	92(35)	103(39.2)
3	Difficulty in adequately de-roofing the chamber	24(9.1)	56(21.2)	85(32.2)	98(37.5)
4	Encounter iatrogenic perforations	77(29.1)	77(29.4)	90(34.3)	19(7.2)

Table-II. Challenges during access opening

Question		Difficulty Grading n (%)			
		Never	Rarely	Sometimes	Frequently
1	Difficulty in reaching the apex or establishing working length?	31(11.7)	113(42.8)	101(38.3)	19 (7.2)
2	Difficulty in reading the radiograph	33(12.5)	125(47.3)	83(31.8)	22(8.3)
3	difficulty to feel the apical constriction	17(6.4)	22(58)	90 (34.5)	98(37.1)
4	Difficulty in using apex locator	20(7.6)	51(19.4)	70(26.6)	102(38.8)
5	Any other	Did not used apex locator 7.6(20)			

Table-III. Challenges during working length determination

Question		Difficulty Grading n (%)			
		Never	Rarely	Sometimes	Frequently
1	Loss of working length during shaping	32(12.2)	118(44.7)	97(37)	16(6.1)
2	Canal blockage	78(29.6)	82(31.2)	91(34.6)	12(4.6)
3	Ledge formation	104(39.7)	80(30.2)	65(24.8)	14(5.3)
4	encounter iatrogenic perforation in the apical third	125(47.5)	67(25.5)	55(20.8)	16(6.2)
4	Canal transportation	124(47.1)	70(26.4)	57(21.8)	12(4.6)
6	Strip perforation	125(47.3)	65(24.8)	62(23.6)	11(4.3)
7	Encounter file separation	106(40.2)	79(30.1)	64(24.3)	14(5.4)
8	Difficulty in achieving continuous tapering preparation	65(24.6)	92(35)	94(35.8)	12(4.6)
9	Flare up	88(33.5)	83(31.2)	76(29.2)	16(6.2)
10	Encounter sodium hypochlorite/chemical accident	135(51.2)	71(26.9)	42(16.2)	15(5.8)
11	Handling difficulties of chelating agent	112(42.5)	69(26.4)	56(21.1)	20(7.7) Others 2.3(6)

Table-IV. Challenges during cleaning and shaping procedures

Question		Difficulty grading n (%)			
		Never	Rarely	Sometimes	Frequently
1	Lack of tug back	28 (10.7)	142(53.8)	81(30.9)	12(4.6)
2	Difficulty during sealer placement	61(23.4)	118(44.8)	73 (27.6)	11(4.2)
3	Difficulty in master cone placement	44(16.7)	108(41.1)	92(35)	19(7.2)
4	Difficulty in taking spreader to 1-2 mm of WL	33(12.5)	107(40.7)	104(39.5)	19(7.2)
4	Bending of accessory cones	21(8.1)	43(16.2)	90(34.4)	109(41.3)
6	Void in obturation	28(10.7)	127(48.1)	88(33.6)	20(7.6)
7	Short obturation	23(8.9)	70(6.6)	80(30.5)	90(34)

Table-V. Challenges during obturation

DISCUSSION

In this study the difficulties faced by final year students and house officers in performing endodontic treatment were explored. The final year students have the prior training of preclinical endodontic exercise performed on extracted teeth in their third year. In their nine weeks clinical rotation in final year, the students are required to complete at least two endodontic treatments on patients under the direct supervision of their clinical supervisor. The house officers are required to complete a mandatory two months rotation in the endodontic department where they work in indirect supervision of the faculty.

The data analysis of this study showed that out of the total sample 64.5 % of the participants were house officers and 35.5 % were final year students. It was observed that the students seemed reluctant to fill out the form due to the less number of procedures they had performed. Most of the participants had performed less than 20 procedures as was expected at their level of training.

In the patient management section, the foremost challenge was noted in rubber dam application. Possible reasons for the difficulty in rubber dam application could be the treatment of mostly posteriors, grossly carious teeth as well as crowded or malaligned teeth. In clinical practice application of rubber dam in such situations is difficult compared to the sound and aligned teeth selected during preclinical training exercises.¹³ Another reason could be that since the House officers are relatively new to handling greater number of patients as well as the multistep endodontic procedure therefore they face problem in adequate time management. This finding is in

agreement with a study conducted by Altorisy which reported that 63% of senior undergraduate students were not confident regarding rubber dam application on maxillary molars due to their anatomy and position.¹⁴ Other studies have also documented reasons for lack of popularity of rubber dam use among students such as unavailability of material, underuse amongst seniors, and patients' reluctance.⁵ Therefore, rubber dam should be made compulsory as it is an essential component of endodontic procedures according to the standard operating procedures. This should encompass both pre-clinical exercises and the clinical practice of students and house officers to reinforce this practice.¹⁵

During access opening, difficulty in locating canals (39.2%) and de-roofing the chamber (37.5%) were the most commonly reported problems. These findings are supported by the results of a study conducted at Biruni university where 47.9% of students had trouble in canal identification and 56.3% had difficulty in removing the roof of the chamber.⁸ The factors responsible for this difficulty could be that during access opening, the improper angulation of bur, the clinical extent of caries, variable root canal morphology, limited mouth opening and wrong chair positioning add up to make it perplexing task for a new clinician.¹⁶ This could be addressed by improving the knowledge of root canal morphology, ergonomic chair positioning for maxillary and mandibular arches and increasing the number of exercises and patients in endodontic rotations.^{17,1} Additionally, determining pulp space anatomy and canal orifice location can be aided by the use of magnification with dental loupes, use of ultrasonic devices for troughing of grooves,

staining the pulp chamber floor with methylene blue dye, performing champagne bubble test, use of sharp DG16 explorer in the initial learning phase of endodontic treatment on patients.¹⁸ Role modelling by senior clinicians in the department with good clinical practice can also be a significant contributing factor in honing the clinical skills of the young graduates.^{19,20,21}

In working length determination, most of the participants did not face difficulty in traditionally determining working length with radiographs however 38.8% of the participants found it challenging to use apex locators. Whereas, Mirza et al had reported in his study that only 19.4% of the final year students of Salman bin Abdul-Aziz University frequently faced difficulty in using apex locator.⁵ Currently, the concept of the apex locators is not introduced in preclinical years therefore many of students and house officers are apprehensive in its use. Early introduction, practical application and frequent use of apex locators may help to solve this problem.^{1,22}

Interestingly canal preparation was not considered challenging by most of the participants. The most difficult step was the use of chelating agents reported by 7.7 % of the participants whereas procedural errors were rarely encountered with strip perforation being the least occurring issue reported by only 4.3 % participants. Lack of theoretical knowledge, availability of material and the stringent dispensing by department could be some of the hurdles in use of chelating agents. Most students and house officers show diligence in the canal preparation steps performed under the supervision of senior faculty accounting for the low occurrence of procedural errors.²³

The greatest difficulty during obturation was reported in the use of accessory GP (41.3%) after the placement of the master GP cone. This could be due to the difficulty in envisioning the canal space during the obturation. Gutta purcha of the smaller size tend to be thinner and thus more likely to bend while inserting making it more challenging for the operator. Similarly under-obturation (34%) and over-obturation (19.7%) were frequently encountered. This result is in agreement with a

study done by AlGhamdi et al which reported that 68% of undergraduate students had frequently performed underobturations in endodontic treatments.²⁴

Interestingly, the participants mostly did not find the remaining steps of the obturation to be challenging.

The factors identified by the participants indicate the reasons of increased stress in a young dentist's life regarding performing good quality endodontic treatment independently. Adequate training and supervision can help to reduce this stress in the mind of students. Changes in the curriculum of the undergraduate program, for example the concept and use of apex locators and rotary endodontic, may help to solve some of the problems. Improving the ratio of students to supervisors might lead to better understanding and execution of the steps of the endodontic procedure. It will improve the mental health and quality of work of the clinician leading on to the betterment of patient care quality and wellbeing of the community.

CONCLUSION

The current study identified the challenges during the various steps of endodontic treatment. Rubber Dam application was identified as a major challenge in patient management. Difficulty in the use of apex locators leads to difficulty in working length determination. Handling of accessory gutta percha was identified as a major hurdle in obturation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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