Original article:

Quality of Root Canal Treatment Performed By Undergraduate Dental Students of Bangladesh Dental College

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Abstract

Background: Root canal treatment are most commonly in Dental clinic, college and hospitals by dentist. It is inevitable for graduated to be qualified to perform root canal treatment efficiently. **Objective:** Evaluation of quality of root canal treatment by undergraduates of Bangladesh Dental College. **Materials and Methods:** A retrospective study was performed using a total of 600 intra periapical radiographs. Total 200 patient underwent root canal treatment by undergraduates of Bangladesh Dental college were used for assessment. Three qualified investigators assessed the quality of treatment. Descriptive statistics used to present the results. **Results:** 64% of root canal treatment performed by phase IV undergraduates' student. Mostly anterior/single canal root canal treatment were done. As per pulp status, pulpitis, necrosis, periapical lesion and failure of previous root canal treatment were high. Among complications, instrument breakage and under filling were 14% and 12 % respectively. Percentage of acceptable to perfect quality of root canal treatment was 55% **Conclusion:** Based on results only 4% root canal treatment was perfectly performed which is very low. Acceptable quality of root canal treatment percentage was 51%.

Keywords: Root canal treatment; Quality; Undergraduate student.

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Introduction

Root canal treatment is an important part of comprehensive oral health care. Root canal treatment (RCT) has high success rates¹. That depends on many variables one of which is the technical quality of the root canal treatment. Smith et al.² reported that the canal preparation technique and the root canal filling length, relative to the radiographic apex, significantly affect the success of conventional RCT.

According to the association for Dental Education in Europe, all dental students should be qualified to perform root canal treatment efficiently after graduation³. The teaching of endodontics is considered a major challenge for those academics responsible for this task more than any other subject in the undergraduate curriculum. Contemporary endodontic curricula focus on optimizing the technical quality of root canal procedures. Although practical exercises by

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preclinical trainings for undergraduates improved the technical quality of RCTs performed by dental students at the clinical stage, only few studies in relation to performance of preclinical undergraduate students have been performed. Based on literature search, till to date no studies addressing this issue have been found in Bangladesh. Hence, the aim of this study was to evaluate the Quality of RCT performed by undergraduate dental students after preclinical course in Bangladesh.

Materias And Methods

Study design: A retrospective study

Study Sample and Study location: 600 intraoral periapical radiographs of 200 cases undergone RCT in the department of Conservative Dentistry and Endodontics of Bangladesh Dental College, Dhaka by the students of phase III & IV who completed a preclinical course, which includes both theoretical and practical laboratory training of RCT on extracted teeth. Six hundred Post-operative radiographs were collected from the dental records of the patients. The records containing radiographs of pre-operative, working length/master cone, and post-operative were only included in the study. The radiographs, in which root apex is not seen, too much elongated or

shortened and radiographs with bad quality were excluded.

Evaluation: The radiographs were independently evaluated using X-ray viewer by two Endodontist. In case of disagreement, the third investigator was assigned to make the final decision.

The RCT was assessed for filling at the end of the root with radiographic apex, the density of the filling material, and taper from the orifice to apex (Table I). After assessing, the quality of RCT was recorded as totally unacceptable, slightly unacceptable, acceptable and perfect based on the treatment score (Table II). The following procedural errors were assessed as clinical endpoints of treatment: furcal perforation, cavity wall perforation, transportation, root perforation, instrument breakage, and ledge formation, under filling, voids and missed canal.

Analysis: The analyses of the data were performed using MS Excel 2013 and the descriptive results were presented.

Calibration: Before the study, 20 periapical radiographs not included in the study were used to calibrate the examiners and came to an agreement for the criteria for evaluation.

Table I: Parameters used to evaluate root canal obturation

Parameter	Definition	Score
Length of root canal obturation	Root filling ending >2 mm short of the radiographic apex (under-filling)	0 (unacceptable)
	Root filling limited to the pulp chamber	0 (unacceptable)
	Root filling ending beyond the radiographic apex (over-filling)	0 (unacceptable)
	Root filling ending at the radiographic apex (tip-totip) or 1-2 mm shorter than the radiographic apex	1 (acceptable)
	Root filling ending 0.5-1 mm short of the radiographic apex (adequate)	2 Perfect
Density of root canal obturation	Inhomogeneous root canal obturation with several visible voids	0 (unacceptable)
	Root canal obturation with only one visible void	1 (acceptable)
	No void present in the root canal obturation (adequate)	2 Perfect
Taper of root canal obturation	Not consistently tapered from the apex to the coronal part (over- or under-shaped)	0 (unacceptable)
	Not enough taper	1 (acceptable)
	Consistently tapered from the apex to the coronal part (adequate)	2 Perfect

Table II: Scoring for evaluation of root canal treatment

Score	Quality of Treatment
0-2	Totally Unacceptable
3-4	Slightly unacceptable
5	Acceptable
6	Perfect

Results

Table 3 show the number of RCT done by the students. Table 4 detailed the RCT performed teeth type. Table 5 highlights the pulp status of all 200 RCT treated teeth pulp status. Table 6 describes the complications related to all 200 RCT treated teeth.

Details of the quality of the treatment are showed in table 7.

Table III: Distribution of performing students according to level of education

Level of education	Number of teeth	Percent
Phase III	72	36
Phase IV	128	64
Total	200	100

Table IV: Sample distribution according to tooth type

Tooth type and location	No. of teeth	Percent
Upper incisor	38	19
Lower incisor	32	16
Upper Canine	32	16
Lower Canine	26	13
Upper Premolar	28	14
Lower Premolar	14	7
Upper Molar	12	6
Lower Molar	18	9
Total	200	100

Table V: Sample distribution according to pulp status

Pulp status	No. of teeth	Percent
Healthy pulp	0	0
Reversible pulpitis	44	22
Irreversible pulpitis	38	19
Necrosis	34	17
Periapical lesion	40	20
Failure of previous endodontic treatment	28	14
Unknown	16	8
Total	200	100

Table VI: Sample distribution according to complications of treatment

Complications	No. of teeth	Percent
No complication	56	28
Furcal perforation	10	5
Cavity wall perforation	16	8
Transportation	14	7
Root perforation	6	3
Instrument breakage	28	14
Ledge formation	16	8
Under filling	24	12
Voids	6	3
Missed canal	24	12
Total	200	100

Table VI: Sample distribution according to quality of treatment

Complications	No. of teeth	Percent
Totally Unacceptable	24	12
Slightly Unacceptable	66	33
Acceptable	102	51
Perfect	8	4
Total	200	100

Discussion

Recent years have seen a marked increase in the demand of patients for root canal treatment due to the increased age of the population, so dental students should possess the knowledge and skills in this discipline before the need increases even more. The assessment of dental student performance in endodontics will help to improve dental education [4]. Therefore, undergraduate training should promote the comprehension of root canal treatment outcome and related factors. Quality of root canal treatment may affect the outcome of the procedure and the long-term retention of teeth. Development of apical lesion or endo-perio lesion are related with the quality of the root treatment. The standard of root canal treatment carried out in teaching hospitals by learners is poor. That quality of treatment might be

due to lack of expertise and a poor understanding of the principals involved [5]. Although some studies show that the technical quality of root canal treatments performed by undergraduates demonstrates a good quality of endodontic work in a very wide range, between 13% and 70% [6]. Procedural errors compromise root canal cleaning and shaping, and result in incomplete root filling and jeopardize the outcome of the treatment.

An association between root-canal-specific training as an undergraduate and improved quality of root canal obturation by dental graduates has been reported [7]. Evaluation of root canal treatment quality has been shown to assist in planning future endodontic educational programs [8]. The quality of root canal filling is an important component of endodontic treatment. To improve clinical performance, knowledge, training, ability, and utilization of technology are necessary. Studies of the quality of root canal treatments (RCTs) and prevalence of endodontic procedural

accidents can improve educational programs, leading to improvement in the oral-health-related quality of life. Evaluation of the technical quality of root canal obturation is based on the limit and density of the obturation material [9]. The length of root canal obturation from the radiographic apex and its density and taper have also been used to evaluate RCT. Canals with a 0- to 1-mm distance between the radiographic apex and the end of the obturation material were more successful than were canals in which the obturation material ended more than 1–3 mm from the radiographic apex. However, both are preferable obturation materials that extrude through the apex [10].

Conclusion

Based on results acceptable to perfect quality RCT performed by student of Bangladesh Dental college was 55%. Totally unacceptable and slightly unacceptable quality of RCT percentages were 12 and 33 respectively.

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