

Quality of Root Canal Obturation Performed by Senior Undergraduate Dental Students

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ABSTRACT

The aim of the present study was to assess the quality of canal obturation performed by undergraduate dental students at Saveetha Dental College and Hospitals, Chennai. Records of 200 endodontically treated teeth from patients who were visited by undergraduate students between months of November 2014 to May 2015. Periapical radiographs of all treated teeth were assessed in terms of canal obturation quality (adequate density and length). Forty-five percent of teeth fulfilled the criteria of an acceptable root canal obturation. Adequate length and density of root filling was found in 89% and 34% of teeth, respectively. There was a significant difference between maxillary and mandibular teeth regarding the length of root canal obturation. A significant difference was observed between molars and other tooth types. The frequency of root canals with an acceptable filling was significantly greater in the anterior teeth compared to premolars or molars. The technical quality of root canal treatment performed by undergraduate dental students was found to be less than ideal.

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1. INTRODUCTION

Preservation of the natural dentition has become more popular in the society [1]. Therefore, endodontic therapy is becoming an increasingly routine part of general dental practice [2]. Success of root canal treatment has been reported to be 53-94% [3],[4]. The methods for assessment of endodontic treatment outcome are mostly based on radiographic evaluation only [5]-[7], combination of radiographic and clinical evaluation [8]-[10] or histological examination, in case of treatment failures [11],[12]. The quality of root canal treatment performed by general practitioners in different populations has also been extensively investigated in many studies, the results of which have shown high percentage of inadequate root canal treatment [7],[13]-[15]. The reasons are complex and may be related to the different endodontic teaching methods at dental schools [16]. Some of the problems in endodontic teaching may be attributed to limited time allocated to endodontics, poor staff-to-student ratios and the fact that many endodontists have not taken the teaching skills [17]. Students are taught endodontics from 3rd year onwards till internship, at Saveetha Dental College and Hospitals, Chennai are expected to perform endodontic treatment on a variety of teeth belonging to the patients diagnosed to require root canal treatment. The aim of this observational study was to evaluate the technical quality of root canal obturation using radiographs of teeth treated by 3rd year till interns undergraduate dental students at Saveetha Dental College and Hospitals, Chennai.

2. RESEARCH METHOD

Records of 200 patients, who had received endodontic treatment by 3rd year till intern undergraduate students at Saveetha Dental College and Hospitals, Chennai from 2014 November till 2015 May, were

selected and evaluated. Records that did not include preand post-operative periapical radiographs or those with poor radiographic quality besides the records of patients with incomplete endodontic treatment were excluded. The final sample consisted of 200 documents of endodontically treated teeth. Among these, 61 were anterior teeth while 47 and 92 teeth were premolars and molars, respectively. An aseptic technique with rubber dam isolation had been applied in all the cases and working lengths was determined by means of radiographs. All the teeth had been instrumented with passive step-back technique using stainless steel K-files with 0.02 taper and irrigated with 2.5% sodium hypochlorite solution. Root fillings had been carried out with lateral compaction technique using gutta-percha. All the teeth had been temporarily filled and referred for permanent restoration. All the treatment steps were conducted under the supervision of teaching staff. Evaluation of the technical quality of root canal treatment was based on the immediate postoperative RVG of each case. The final RVG were examined by two independent investigators using with a few selected cases which were not included in the study [16]. An evaluation form was designed to record the information gathered from the immediate postoperative radiographs. The method of viewing the radiographs was standardized using RVG. The results were compared and a final result was concluded. Each root was scored individually and the tooth was considered as a unit. In multi-rooted teeth, the highest score of all the roots was attributed to the tooth and ultimately, failure of one root was considered the failure of the tooth as a whole. The quality of endodontic treatment was determined by the length of root canal obturation in relation to the radiographic apex and also the density of the obturation based on the presence of voids as shown in Table 1. Meanwhile, Table 2 shows the distribution of teeth in maxillary and mandibular arches. Hence, Table 3 provides information about overall quality, length, and density of root canal filling.

Table 1. Criteria for assessment of radiographic quality of root canal filling

Parameter	Criteria	Definition
density of root canal filling quality	Adequate	No voids present in the root filling or between root filling and root canal walls
	Inadequate	voids present in the root filling or between root filling and root canal walls
length of root canal filling	Acceptable	Adequate length and density
	Adequate	Root filling ending <2mm from radiographic apex
	Over filling	Root filling beyond the radiographic apex
	Short -filling	Root filling >2mm from radiographic apex

Table 2. Distribution of teeth in maxillary and mandibular arches

Tooth type	N	%
Maxillary	87	44
Maxillary anterior teeth	87	44
Mandibular	113	56
Mandibular anterior teeth	1	0.5
Mandibular premolar	20	10
Mandibular molars	92	45.5
Total	200	100

Table 3. Overall quality, length, and density of root canal filling

n	Quality		Length			Density	
	Acceptable	Unacceptable	Adequate	Short filling	Over filling	Acceptable	unacceptable
200	90(45%)	110(55%)	178(89%)	15(7.5%)	7(3.5%)	69(34.5%)	131(65.5)

3. RESULTS AND DISCUSSION

The teeth were classified according to their location in the arches. The frequencies of teeth examined in this study are shown in Table 2. There were 87 maxillary and 113 mandibular teeth. Quality of root canal filling (i.e. length, and density) is shown in Table 3. Ninety teeth (45%) fulfilled the criteria of an acceptable root canal filling. Adequate length of the root filling was found in 89% of teeth, while 7.5% were underfilled and 3.5% were overfilled. Adequate density was found in 34% of teeth. The frequency of root canals with unacceptable obturation was significantly higher than the acceptable.

3.1. Discussion

This study aimed to evaluate the quality of root canal treatment carried out by senior undergraduate students at Saveetha Dental College and Hospitals, Chennai. Postoperative RVG were used for assessment. The quality of root canal obturation was evaluated [16]. Studies evaluating the radiographic quality of root canal treatment have mostly been based on the evaluation of the length and the density of root canal obturation [18]-[21]. The results of this study showed that quality of root canal obturation was less than ideal. The reasons for this fact are complex and may be related to the endodontic teaching strategy undertaken at dental schools [16]. The quality of maxillary and mandibular root fillings was the same in this study. The frequency of teeth with an acceptable root canal obturation was significantly lower (45%) compared to unacceptable (55%) who reported that the technical quality was acceptable more often in anterior teeth. This may be explained partly by the anatomy of these teeth. The percentage of root canal fillings with adequate length was 89% in the present study. The higher percentage of overfillings reported in other studies may be attributed to the higher incidence of teeth with preexisting periapical radiolucency in these studies [10],[19],[21]. These lesions can result in resorption and destruction of the apical constriction and this loss may have influenced working length control by undergraduate students. Inadequate density of root canal obturation may lead to failure of root canal treatment because of microleakage along the root filling [20]. To sum up, in order to improve the technical quality of root canal treatment performed by undergraduate dental students, the endodontics curricula have to be revised. Thus, the time of training of the students at the clinic has to be extended, and subsequently the clinical requirements for endodontics have to be increased, so that the student will be given more time to treat more cases. The clinical training courses have to be arranged to provide the students with proper skills in endodontics.

4. CONCLUSION

According to the results of this observational study, the technical quality of root canal treatment performed by undergraduate dental students was found to be better on the anterior teeth compared to the posterior teeth. Thus, revision of training courses for the students at the clinic is suggested more to be given on the posterior teeth.

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