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Radiographic Quality of root fillings performed by dentists in Jammu and Kashmir, North India

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Abstract

The present study aimed at assessing the quality of root canal obturations being performed in the state of Jammu and Kashmir. Records of 1056 endodontically treated teeth from patients who visited the department of Conservative Dentistry and Endodontics, Indira Gandhi Government Dental College, Jammu were obtained. Intra-oral periapical radiographs of all treated teeth were assessed in terms of canal obturation quality (adequate length and density). Fifty-one percent of the teeth fulfilled the criteria of an acceptable root canal filling. Adequate length and density was found in 78% and 24% of teeth, respectively. Our findings underline the need to improve the quality of endodontic health care being provided to the average patient in the state of Jammu and Kashmir.

Keywords: Endodontics; Radiograph; Root Canal Filling; Root Canal Treatment; Technical Quality.

Introduction

Dentistry has seen a paradigm shift to conservation of natural dentition with endodontics becoming an increasingly routine part of dental practice.(1) One of the key determinants of success of endodontic treatment is the radiographic quality of the root canal treatment.(2)

Follow-up studies on root canal treatment(3-7) have reported that the technical quality of endodontic treatment may affect the prognosis and the long-term retention of teeth. The probability of post-obturation apical periodontitis was again closely correlated with the quality of the root filling.(8,9) Optimal peri-radicular health is associated with root fillings that terminate within 2 mm of the radiographic apex and that are of adequate radiographic density.(10-12)

For appreciating 'the technical quality of root fillings', their length in relation to the apex and their homogeneity are noted.(13)

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.(8,12,14,15) 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 up teaching in dental schools as a profession.(17)

The aim of this study was to radiographically evaluate the quality of root canal fillings done by random dentists in Jammu.

Materials and Methods

A descriptive, cross-sectional study was conducted at Indira Gandhi Government Dental College and Hospital, Jammu in January 2016. A random sample of 1056 radiographs of patients reporting to the Department of Conservative Dentistry and Endodontics were considered which included already root canal treated teeth (by unknown dentists), not indicated for treatment at the time, incidentally detected on diagnostic radiographs made for other etiologies. Records of patients younger than 18 years of age were discarded. Unreadable radiographs due to developing procedures, superimposed anatomical structures and in proper storage conditions were excluded. Records of third molars were also excluded.

All radiographs were taken with bisecting angle technique using an Ergon-X HF (MI, Italy) unit. Care stream E-Speed, size 2 films were exposed at 70 Kv, 7 mA. The post-obturation radiograph showed the entire length of the root and the periapical area.

Two observers- both endodontists (AM and RK)- examined the radiographs. Final scoring was done through consensus. Periapical radiographs were evaluated in a darkened room via a standard view box and a magnifying glass (3.5X). Measurements were recorded using a transparent ruler of 0.5 mm accuracy.

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 technical quality of the root filling(18) was evaluated according to the density of the filling and the distance between the end of the filling and radiographic apex and scored as follows:

Length of the root filling

1. Root filling terminating 0-2 mm from the radiographic apex (acceptable).
2. Root filling terminating >2 mm from the radiographic apex (unacceptable).
3. Root filling extending beyond the radiographic apex (unacceptable).

Homogeneity of the root filling

1. Homogeneous root filling, good condensation, no voids visible (acceptable).
2. Inhomogeneous root filling, poor condensation, voids visible (unacceptable).

A root canal with an acceptable filling length and a homogeneous root filling was defined as being good quality endodontic work (GQEW).[19] A treated tooth was defined as having good quality endodontic work tooth (GQEW-T) when all its canals had a GQEW.[13]

Endodontic mishaps such as unsealed perforations and instrument fractures were graded as unacceptable.

Results

A total of 1056 root canal treated teeth were assessed for the technical quality of their obturations radiographically. Quality of root canal filling (i.e. length, and density) is shown in Table 1. 539 (51%) fulfilled the criteria of an acceptable root canal filling.(Fig. 1) Adequate length of the root filling was found in 78% of teeth, while 16.5% were underfilled and 5.5% were overfilled.(Fig. 2) Adequate density was found in 24% of teeth.(Fig. 3) The frequency of root canals with acceptable obturation was higher than that of unacceptable obturations.

Table 1: Overall quality, length, and density of root canal filling

N	Quality		Length			Density	
	Acceptable	Unacceptable	Adequate	Short-filling	Over filling	Acceptable	Unacceptable
1056	539 (51%)	517 (49%)	824 (78%)	174 (16.5%)	58 (5.5%)	253 (24%)	803 (76%)

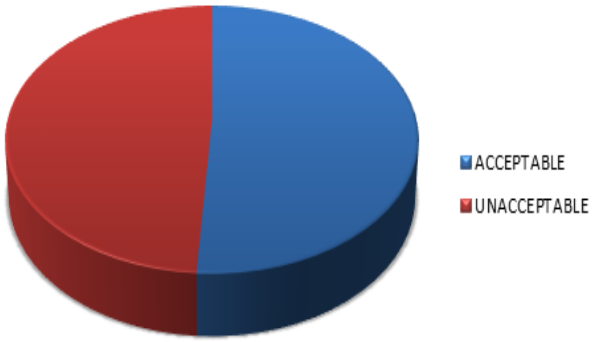

Fig. 1: Overall quality of obturations

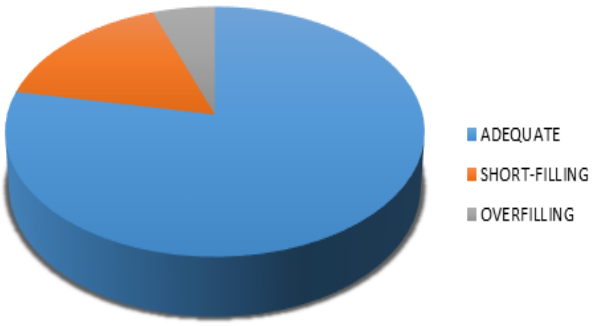

Fig. 2: Length of obturations

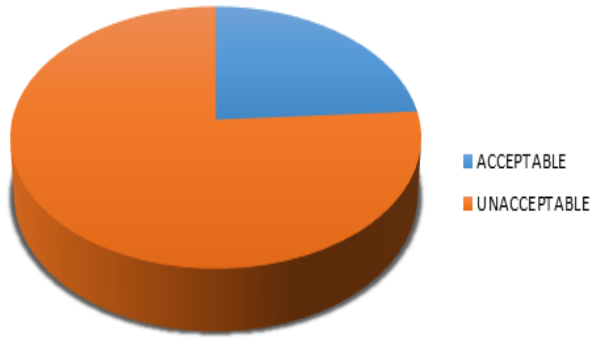

Fig. 3: Density of the obturations

Discussion

It can be presumed that the entire canal has been instrumented upto the apex of the tooth and that an apical seal has been established when the root canal filling is gauged as GQEW. This would prevent subsequent ingress of microbes and infective material into the canal.[2] It is opined by many endodontists that root fillings terminating within 2mm of the radiographic apex can be considered acceptable as the apical constriction on average lies within 1-2 mm of the radiographic apex.[20]

Our study aimed to evaluate the quality of root canal obturations carried out by random dentists in the state of Jammu and Kashmir (J & K), India. Conventional intra-oral periapical radiographs were used for assessment. Root canal filling quality assessment was done using well-defined criteria established previously by other authors.[13] The results clearly indicate that nearly every

second root canal filling done in J & K is unacceptable according to set standards. The reasons may be multi-factorial and need to be addressed immediately in order to improve the quality of dental health care being provided to the patients. The state of J & K has three teaching dental institutions, two of which are government run. Major bulk of the practicing dentists, are those who complete their education outside and then return. Furthermore, the question of quackery, especially prevalent in the rural areas arises. Moreover, these findings may be related to the endodontic teaching strategies undertaken at dental schools.[21]

Many studies have assessed the radiographic quality of root fillings performed by undergraduate students using such criteria of assessment. A study done in Ireland has determined that 70% of the teeth showed an acceptable quality[22] whereas another study in Turkey has shown a higher level of acceptability of 79%.[13] In the Asian region, the level of acceptability has been slightly lower than the European studies, where a study in Taiwan has shown a 62% acceptable level and a 61% acceptable level in Jordan.[16,19]

More recently, a study in Sri Lanka has shown a 74.3% acceptable level.[2] Closer home, a study in Chennai found 45% of root canal obturations done by undergraduate students to be of acceptable quality.[21]

Inadequate density of root canal obturation may lead to failure of root canal treatment because of micro leakage along the root filling.[23]

To sum up, in order to improve the technical quality of root canal treatment performed by dental professionals, 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.

Conclusion

According to the result of this study, the quality of root fillings being conducted in the state of Jammu and Kashmir requires a lot of improvement as only 51% of sample studied demonstrated acceptable obturation quality radiographically. Refining of techniques of dentists is required. The need for educating dental professionals about newer techniques and instruments cannot be stressed enough. Furthermore, we suggest enforcement of stringent laws to check the standard of dental clinics running across the state, as well as the qualification of individuals running the same.

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