ORIGINAL ARTICLE

A cross sectional study on Analysis of Reasons of Root Canal Treatment and Re-Treatment in Pakistan

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ABSTRACT

Introduction: The endodontic therapy or root canal therapy (RCT) requires the removal of diseased pulpal tissue to avoid and intercept pulpal or periradicular pathosis and the defense of the disinfected tooth from potential microorganism entrenchment**.** This study was carried out with an objective to identify the reasons for root canal treatment and to understand disease pattern, outcome of previous treatments and their cost effectiveness.

Materials and methods: The Department of Operative Dentistry, Lahore Medical and Dental College, Lahore, conducted this cross-sectional descriptive research. A total of 200 patients reporting to the Department of Operative Dentistry were included. Information was collected by means of a specially developed proforma, with information on sociodemographic variables and basic dental odontogram and a criterion for the treatment and re-treatment of the root canal.

Results: Irreversible pulpitis (86) 43.0% was the most predominant cause followed by necrotic pulp (44) 22%. Failed RCT comprised of (29) 14.5%, followed closely by trauma, which accounted (22) 11.0% of the teeth.

Conclusion: There is a need to implement effective prevention measures along with patient education and early treatment of carious lesions to reduce the need for root canal surgery. In general practice and educational programs in the endodontics discipline, there is also a need for careful supervision of root canal procedures.

Key words: RCT, Irreversible pulpitis, necrotic pulp, Failed RCT

INTRODUCTION

Rickets and Dixon in 1931 [1], postulated a hollow tube theory for RCT, tissue fluids entering the root canal stagnates and toxic breakdown products are created, which then passed into the periapical tissues. Originally, this idea, that dead spaces must be obturated inside the body, formed the basis for filling root canals. Kakehashi, Stanley and Fitzgerald [2] concluded in 1965 that pulpal and endodontic concerns were mainly associated with root canal system microbial contamination. Since then, endodontology has concentrated progressively on the ways. The reasons for root canal treatments might be apparent either by patient's complaint of pain, swelling and sensitivity or might be symptomless and become evident on radiographic investigations. The assessment is done by a combination of clinical (signs and symptoms) and radiographic parameters [3]. There could be several reasons for root canal treatment depending upon the nature of insult to the vital pulp. A criterion of reasons for root canal treatment is derived from Saad and Clem [4] to understand the disease pattern. It will not only effect the treatment plan but will also exhibit a profound effect on outcome and quality of treatment.

Grossman [5] divided the causes of failed RCT into four categories: poor diagnosis, poor prognosis, technical difficulties, and careless treatment. If the teeth had critical pulps prior to treatment, Sjögren et al [6], recorded a 96% success rate. If the pulps were necrotic and the teeth had periradicular lesions, the success rate decreased to 86% and fell even further to 62 %if the teeth were re-treated. They concluded that teeth are big therapeutic problems with pulp necrosis and periradicular lesions. A direct correlation between successful RCT and the point of termination of the root filling had also been documented by them.

MATERIAL AND METHOD

This descriptive cross-sectional study was carried out in Department of Operative Dentistry, LMDC, Lahore. The duration of study was one year, from 27th January 2005 to 27th January 2006. 200 patients were included. Sampling technique used was Non probability purposive sampling. Patients with age 18 to 50 years, both genders, teeth with necrotic pulp, irreversible pulpitis and history of trauma, teeth requiring intentional RCT and re-treatment were included. Patients with third molars, unrestorable teeth, root fractures and periodontally compromised teeth were excluded. Patients with limited mouth opening and patients with medical problems such as diabetes, hypertension and bleeding disorders were also excluded. Information on reasons for root canal treatment was obtained through a specifically designed proforma which included reasons for RCT and failed RCT. In addition the proforma also contained the basic dental odontogram. All of the patients had been examined and assessed by the investigator, and the examiner reliability had been checked by re-examination of 10% of the patients by a senior faculty member. Data was analyzed using SPSS version 10.0.

RESULTS

In this study the percentage distribution of reasons for RCTs is shown in Table 1, irreversible pulpitis 86 (43.0%) was the most predominant cause followed by necrotic pulp 44(22%). Failed RCT comprised of 29(14.5%), followed closely by trauma, which accounted 22(11.0%) of the teeth. The "Others" 19(9.5%) comprised of intentional RCT (3.5%), pathological pulp exposure (3.5%), and root resorption and periapical pathosis accounted for (2.5%). In the percentage distribution of reasons for failed RCTs short obturation was the predominant cause 12(41.4%), over obturation accounted for 7(24.1%) and periapical pathosis

comprised of 5(17.2%) of the re-treated teeth. Coronal leakage accounted for 3(10.3%). The others 2(6.9%) were comprised of instrument fracture and incomplete obturation. The overall failure was 29(14.5%).

Table I: Distribution of Patients According to Age

Age of Patients	Frequency	Percentage	95% Confidence Interval	
< 20 Years	42	21.0	15.4	26.6
20-29 Years	79	39.5	32.7	46.3
30 - 39 Years	41	20.5	14.9	26.1
40 - 49 Years	27	13.5	8.8	18.2
50 and above	11	5.5	2.3	8.7
Total	200	100.0		
Mean	28.07			
S.D.	11.353			

Table II: Distribution of Patients According to reasons of RCT

		Frequency	Percentage
Reasons of RCT (n = 200)	Necrotic Pulp	44	22.0
	Irreversible Pulpitis	86	43.0
	Trauma	22	11.0
	Failed RCT	29	14.5
	Reasons Other Than Above	19	9.5
Failed RCT	Yes	29	14.5
	No	171	85.5
Reasons for failed RCT (n=29)	Short Obturation	12	41.4
	Over Obturation	7	24.1
	Periapical Pathosis	5	17.2
	Coronal Leakage	3	10.3
	Other, (Instrument Fracture, Incomplete Obturation)	2	6.9

DISCUSSION

The study has offered valuable information on the reasons for the care of the root canal and retreatment conducted at Lahore Medical and Dental College, Lahore. More representative studies in Pakistan are hoped to be conducted in the future, which will help in planning for dental facilities and provision of improved dental health to the population of Pakistan. Results in this study showed that patients within age range of 20-29 years made the most prominent group seeking RCT, which was different from other reported studies [3,4]. In this study most of the RCTs were done on female patients which is similar to the previous studies [3,4, 7, 8] where the number of female patients was higher as well, and it was attributed to their different eating habits as compared to males such as, more frequent intake of edibles and dietary sugars.[9,10]

Irreversible pulpitis was the most frequent reason for performing RCTs followed by necrotic pulp, which accounted for second most predominant cause. If these are to be considered natural sequelae of dental caries, the results were similar to those reported in Pakistan by Fahim et al [7]and elsewhere by Shahid et al [3], Serene and Spolsky [8] and Saad and Clem [4]. Therefore caries represent a major problem, as depicted in number of epidemiological studies in Pakistan and other countries. The frequency of intentional RCTs was lower and almost all the related teeth were used as abutment for over dentures. The results of this study were comparable to those of Shahid et al [3] and Saad and Clem [4]. The requirement of intentional RCT had been documented, especially when the establishment of parallelism of clinical crowns was necessary for fixed prosthesis or when the root canals were being used for dowel retention of a crown. Another striking finding was trauma to the anterior teeth. The results were different to the studies mentioned earlier [2-4, 7, 9]. Trauma was a likely cause (11.0%) in this study, because the average age of patient was 28 years with the youngest age reported was 8 years. It has been shown previously that dental trauma was more likely among young patients. Patients reporting for RCT due to trauma generally has good oral hygiene. A high frequency of anterior root treated teeth in this study coincides to that reported by Al-Yahya and Selim [11], Al-Negrish [12] and Fahim et al [7] but are different to that reported by Shahid et al [3].

RCT failures were mainly due to short obturation (41.4%) rather than over obturation (24.1%) and periapical pathosis (17.2%). It was argued that the channels are completely clean in over obturation and that extruding material provides excellent apical seal and was well tolerated by periapical tissues [13]. In case of short obturation canals were not cleaned completely and percolation of periapical exudates in the unfilled canal might caused re-infection [14]. Considerable variation has been observed in different studies [16, 17]. A direct correlation was reported between progress and the point of termination of the filling of the root. Teeth filled within 0 to 2 mm from the apex were recorded to have a 94% success rate, which decreased to 76 % if the teeth were overfilled and decreased to 68% if they were filled more than 2 mm short [6]. A higher failure rate had been related to over-obturation mainly because of toxicity of the materials [16, 17]. One recent study showed no correlation as most of the filling materials were considered either biocompatible or showed toxicity only prior to setting [18]. Worldwide, the majority of controlled studies seem to conclude that overfilled canals, teeth with preexisting periradicular lesions and teeth not adequately healed after root canal treatment are correlated with a lower success rate [19-22].

Third most frequent cause was found to be periapical pathosis (2.5%). The primary aim of RCT is to eliminate all irritants from the space of the root canal and to control infection and periapical inflammation [23]. It has been considered as a major requirement for successful therapy [5], because remaining pulpal debris might irritate the periapical tissues and jeopardize periapical repair. Strong evidence has been suggested that after rigorous washing, shaping, and disinfection, bacteria may not be completely removed [24] and when obturation was delayed for several days, bacteria might be able to recolonize in the canal [25]. Intracanal infection were found to be the cause of periapical inflammation and tissue destruction, the degree of which depended upon host resistance and bacterial virulence and population [18].

In this study sample of failed RCTs was small, so a generalized statement about RCTs in Pakistan could not be made. However, most of the failed treatments were reportedly done in private clinics. In a recent study done [26] in a private dental practice it was shown that periapical radiolucency was revealed in 51.7% of the cases, poor obturation in 64% and untreated root canal spaces in 34%. It was shown previously that only 10% of the cases done in general dental practice fulfilled the technical criteria defined by European society of endodontology [27]. However further investigation is required in this regard, if final results

are similar to those achieved in this study, there is a need to train general dentists in the art and science of endodontics.

CONCLUSION

Irreversible pulpitis and necrotic pulp were the predominant reasons for the root canal treatment in this one center study, A significant proportion of root canal treatments were re-treatments due to failed RCT, in which short obturation was dominating. To minimize the need for root canal care, there is a need to incorporate successful prevention, patient education and early treatment of carious lesions. In general practice and training services in the discipline of endodontics, there is also a need to prepare for careful supervision of root canal procedures.

Conflict of interest: None
Source of funding: Non funded

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