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Research Article

**ANALYSIS OF REASONS OF ROOT CANAL TREATMENT
AND RE-TREATMENT**¹Dr. Aliya Ehsan, ²Dr. Jawwad Iqbal Afridi, ³Dr. Aqil Malik^{1,2}BDS, FCPS, The University of Lahore., ³BDS, MSc The University of Lahore.**Article Received:** August 2019**Accepted:** September 2019**Published:** October 2019**Abstract:**

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: This cross-sectional descriptive study was carried out in the Department of Operative Dentistry, Lahore Medical and Dental College, Lahore (LMDC). A total of 200 patients reporting in operative dentistry department were included. Information was obtained through a specifically designed proforma, which contained the basic dental odontogram and a criterion of reasons for root canal treatment and re-treatment.

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 for implementation of effective preventive measures along with patient's education and early treatment of carious lesions to reduce the need for root canal treatments. There is also a need for arrangement of proper monitoring of the root canal treatments done in general practice and educational programs in the discipline of endodontics.

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

Corresponding author:**Dr. Aliya Ehsan,**

BDS, FCPS, The University of Lahore.

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INTRODUCTION:

Rickets and Dixon in 1931 [1] postulated a hollow tube theory for RCT, it stated that tissue fluids entering the root canal are stagnated and formed toxic breakdown products, which then passed out into the periapical tissues. This theory, that dead spaces within the body must be obturated, originally formed the basis for filling root canals. In 1965, Kakehashi, Stanley and Fitzgerald [2] concluded that pulpal and endodontic problems were primarily related to microbial contamination of the root canal system. Since then endodontology has increasingly focused on the ways and means of eliminating microorganisms from the entire root canal system. 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 Clem⁴ to understand the disease pattern. It will not only affect the treatment plan but will also exhibit a profound effect on outcome and quality of treatment.

Grossman⁵ divided the causes of failed RCT into four categories: poor diagnosis, poor prognosis, technical difficulties, and careless treatment. Sjögren et al [6], reported a 96% success rate if the teeth had vital pulps prior to treatment. The success rate dropped to 86% if the pulps were necrotic and the teeth had periradicular lesions and dropped still lower to 62% if the teeth had been re-treated. They concluded that teeth with pulp necrosis and periradicular lesions constitute major therapeutic problems. 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% Interval	Confidence
< 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 provided useful information on reasons for root canal treatment and retreatment conducted at Lahore Medical and Dental College, Lahore. It is hoped that more representative studies would be undertaken in Pakistan 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 al⁷ 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 had been argued that in over obturation the canals are clean completely and that extruding material provides good 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 had been documented between success and the point of termination of the root filling. It is documented that, teeth filled within 0 to 2 mm from the apex enjoyed a 94% success rate, which fell to 76% if the teeth were overfilled and fell further 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, most controlled studies seem to agree that a lower success rate is associated with overfilled canals, teeth with preexisting periradicular lesions, and teeth not preexisting restored after root canal therapy. [19-22]

Third most frequent cause was found to be periapical

pathosis (2.5%). The main objective of RCT is to remove all irritants from the root canal space and the control of 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. A strong evidence was proposed that bacteria might not be completely eliminated after thorough cleaning, shaping, and disinfection. [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 centre study, A significant proportion of root canal treatments were re-treatments due to failed RCT, in which short obturation was dominating. There is a need for implementation of effective prevention, patient education and early treatment of carious lesions to reduce the need for root canal treatments. There is also a need for arrangement of proper monitoring of the root canal treatments done in general practice and educational programs in the discipline of endodontics.

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