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## EVALUATION OF ROOT CANAL THERAPY CARRIED OUT BY NEWLY GRADUATED SAUDI DENTISTS

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### Introduction:

**R**oot canal therapy is a surgical procedure in which the operator exposes the root canal of a tooth to remove vital or necrotic pulp tissue under aseptic condition. This root canal space is then usually filled with a biologically acceptable material. Root canal therapy biologically eliminates inflammatory periapical diseases and promotes healing and repair of periapical tissue.

Prognosis of root canal therapy had been studied by several investigators<sup>(1-6)</sup>. Success or failure is usually assessed after a period of time through clinical and radiographic examination. The frequency of failure had been reported to be with 5%-30%<sup>(1-6)</sup>.

There is no prognostic study done yet at the College of Dentistry of

King Saud University to evaluate the success rate of root canal therapy. Student cases are usually done under the supervision of the endodontics staff, while most of the dental interns (recent graduates) cases are done without strict supervision.

Therefore, the purpose of this investigation was to evaluate the success/failure rate of root canal therapy among dental interns at the College of Dentistry, King Saud University.

### Materials and Methods:

Records of 270 patients were randomly selected. These records were pulled out from the record room and the patients were called for endodontic follow up examination. Only 157 patients with 233 endodontically treated teeth showed

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up. Their ages ranged between 10 and 57 years. All patients had been treated at the College of Dentistry of King Saud University, by male and female dental interns from 1982 through 1988. Table 1, and Figure 1 represent the location of these teeth.

Every patient was phoned and given appointment for check-up. Each endodontically treated tooth was examined clinically and radiographically.

The following were the clinical criteria used to assess the success or failure of treated teeth.

(a) Absence of painful response to percussion and palpation.

(b) Absence of signs and symptoms and:

(c) Absence of sinus tract.

The following were checked routinely during the clinical evaluation of the endodontically treated tooth.

1- Food impaction interproximally.

2- Restoration for high spots (premature contact).

3- Oral mucosa for any ulceration.

4- Oral hygiene and periodontal condition.

5- Tooth fracture.

6- Caries in the adjacent teeth.

If any of the previously mentioned problems were found, the necessary treatment was given and the patient was again evaluated after a week.

The criteria of radiographic success and failure were based on Strindberg's study<sup>(1)</sup> namely:

For success:

(a) Presence of normal periapical bone and periodontal ligament (PDL) structure.

(b) Absence or reduction in size of any periapical pathosis including condensing osteitis.

And for failure:

(a) Development of periapical pathosis not present before.

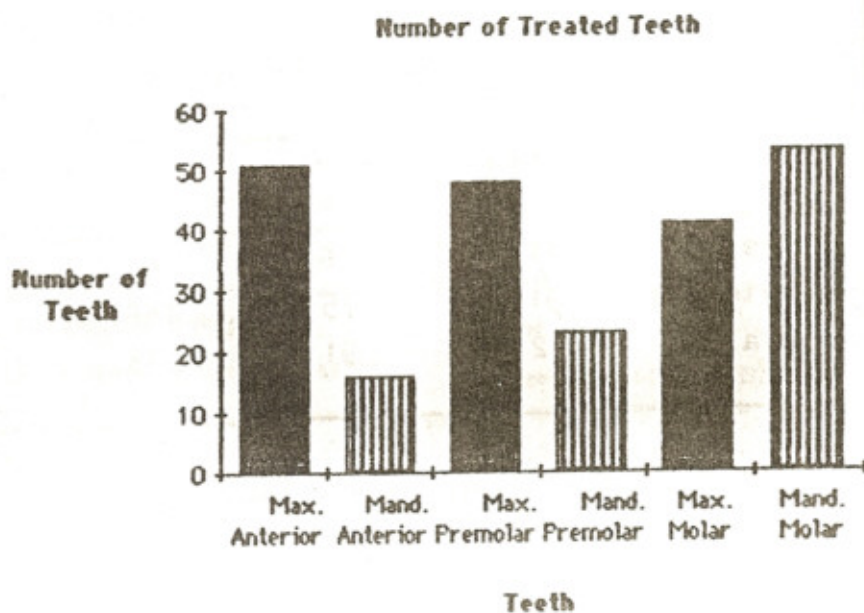
(b) Increase in the size of the periapical pathosis.

When the size of the periapical pathosis did not change, the prognosis was classified as uncertain and the case was kept under observation.

Patients who needed further treatments such as root canal retreatments, surgery or placement of final restoration were given subsequent appointments.

The root canal fillings were classified as follows:

Fig. 1: Distribution of treated teeth





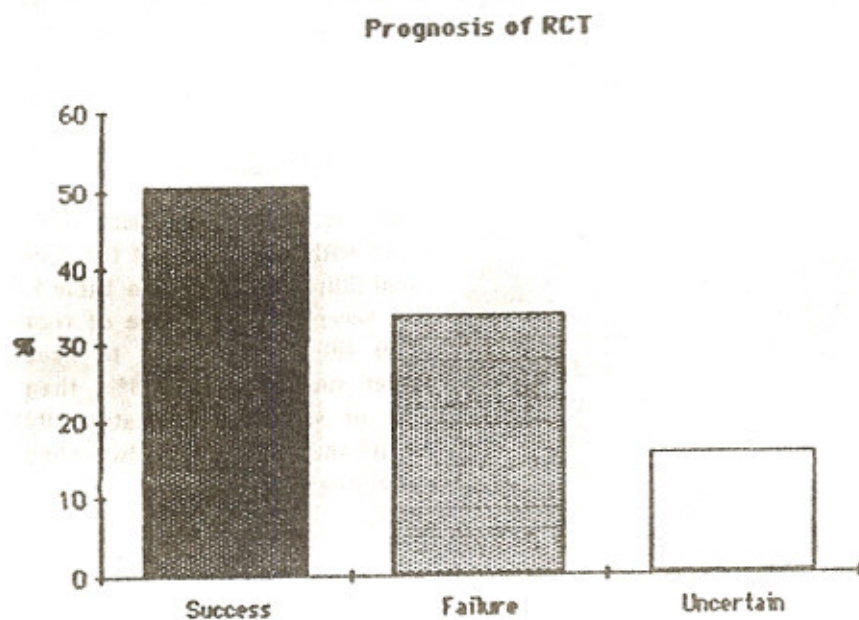
**Results:**

The overall results of the root canal therapy are summarized in (Fig. 2). The success rate was 50.6%, uncertain cases 15.5% and failure 33.9%. No statistically significant differences in the success rates were seen among the various age groups. Success for each age group varied between 40% and 55.6%, while failure varied between 30% and 35% (Table 2). In relation to sex factor, male patients had a slightly higher success rate compared to the female patients (Table 3). A chi-square value of 0.024 was calculated and its value was below the critical value of 3.84, meaning that no significant differences in success rates were found between male and female patients

( $P = 0.05$ ). The lower mandibular molar teeth were the teeth mostly treated followed by the upper maxillary anterior teeth (Fig. 1). The maxillary first molar proved to be the most likely to fail (53.8%) followed by the maxillary later incisor (50%). The female dentist treated more teeth than the male dentist (Table 4).

The success of treatment compared with the quality of the root canal filling is presented in Table 5. The acceptable class type of root canal filling was found to have higher success rate (65.8%) than long or short filling (statistically significant). Long filling always had poor prognosis.

Fig. 2 Overall results from 233 cases of root canal therapy (RCT).



**Table 2:** Success and failure rates of recalled "Endodontics" patients according to age distribution.

Age of patients	No. of treated teeth	No. of Success	%	No. of Uncertain.	No. of Failure	%
10 - 20 yrs	30	12	40.0	9	9	30.0
21 - 30 yrs	79	42	53.2	10	27	34.2
31 - 40 yrs	61	30	49.2	10	21	34.4
41 - 50 yrs	43	23	53.5	5	15	34.9
> 50 yrs	20	11	55.6	2	7	35.0
<b>Total=</b>	<b>233</b>	<b>118</b>	<b>50.6</b>	<b>36</b>	<b>15.5</b>	<b>33.9</b>

**Table 3:** Success and failure rates of endodontic treatment in males and female patients.

Sex	No. of treated teeth	No. of Success	%	No. of Uncertain.	No. of Failure	%
Male	113	62	54.9	10	41	36.3
Female	120	56	46.6	26	38	31.7

Number of treated male patients = 67

Number of treated female patients = 90



Table 4: Root canal therapy by male and female dental interns.

Dentist	No. of treated teeth	Success	%	Uncertain	Failure	%
Male dentist	87	47	54.0	9	31	35.6
Female dentist	144	71	49.3	27	46	31.9

Number of patients treated by male dentist = 76

Number of patients treated by female dentist = 93

8 teeth were treated by both male and female dentist at the same time

2 failed cases had unknown names and were not included in this table

**Table 5:** Prognosis of root canal therapy in relation to class quality of root canal filling

Class of filling	No. of treated teeth	No. of Success	%	No. of Uncertain.	No. of Failure	%
Acceptable	111	73	65.8	15	23	20.7
Short	55	25	45.5	9	21	38.2
Long	67	20	29.9	12	35	52.2

### Discussion:

The College of Dentistry, King Saud University produced its first set of graduates in 1982. After graduation, the new and young dentist (Dental Intern) must finish a one-year internship program. The program included weekly seminar and clinical training where they gave complete and comprehensive treatments to patients. In this program, root canal therapy was one of the services offered by the dental intern. Lateral condensation technique using gutta percha was the standard method used to perform the root canal therapy.

In this assessment study, the success rate among the intern was considered very fair (50%), compared to other prognosis studies<sup>(1-6)</sup>. Studies regarding the success and failure rates of endodontic treatment had been published concerning either the work of dental students or that of endodontists. This study differed a little bit for the simple reason that it sought to evaluate endodontic treatment by "inexperienced" dental interns under no direct supervision of the endodontic staff. The relative independence of the dental interns in giving endodontic therapy may be the explanation for the apparent higher failure rate observed.

The criteria of Strindberg<sup>(1)</sup>,

whose methodology had served as a model in many subsequent prognosis studies, were used in this study.

In this survey, no significant difference in success and failure rates were found when comparing the sex and age of the patients in the five groups. This observation was similar to previously reported studies<sup>(1,4,7)</sup>. Swartz et al<sup>(3)</sup> reported a significantly high success rate in females rather than males. But, they did not speculate on why this was so. We believe that the sex difference in Swartz et al. study may be the result of chance.

The mandibular molars and maxillary anterior teeth were the teeth mostly treated. Caries exposure of the mandibular molars and trauma of the maxillary anterior teeth were the most common indications for root canal therapy. The observation supported an earlier report of Alyahya et al<sup>(8)</sup> on studies in the same College of Dentistry in Riyadh.

The maxillary first molar showed 53.8% failure rate followed by the maxillary lateral incisor (50%). Both accounted for most failures. This could be related to failure in treating an additional canal in the mesiobuccal root of the maxillary first molar or to the curvature of

the root of the maxillary lateral incisor at the apical third. This curvature was found to be difficult to maintain by the interns. Perforation and/or ledging were frequently noticed in the maxillary first molar and maxillary lateral incisor. This might explain why these two teeth failed more than the others. In addition, the multi-rooted teeth were taken as one unit.

If the treatment of one of the roots was evaluated as a failure or uncertain, the evaluation was applied to the whole tooth.

Results showed no significant difference between the performances of female and male dentists. This was expected because both were taught and practiced the same technique. In addition, both used the same root canal filling materials.

In the present study, overfilling was found to have poor prognosis compared to short or acceptable filling. This agreed with the majority of other studies reported before<sup>(1,2,5,7,9)</sup>. It is important to place the root canal filling materials inside the root canal space and not outside to avoid irritating the periodontal ligament and the other surrounding structures. Over-instrumentation would cause the same problem.

A consistent problem regarding patients failure to attend the follow up examination had been pointed out in previous studies<sup>(1,2,10,11)</sup>. Up to 60% failure of clinic attendance were reported<sup>(11)</sup>. In the present study, about 113 patient (40%) did not show up for the follow up examination and were therefore excluded in our evaluation. A possible major reason for patients failure to attend dental clinics may be the demands of a rapidly developing Saudi Arabia unprecedented in the last ten years. There is greater mobility of Saudi people now because of the rapid developments in the Kingdom. More and more Saudis as well as expatriates travel considerably within Saudi Arabia and outside.

Intra- and interobserver differences in endodontic radiographic examination had been studied by several investigators<sup>(12,13)</sup>. The agreement between different observers could be improved if the observers followed strict criteria of evaluation<sup>(13,14)</sup>. In addition, Goldman et al<sup>(12)</sup> reported that the best agreement could be achieved if there were two observers. In this study, the agreement between the two observers was 98%. This agreed with the earlier reports<sup>(12,13,14)</sup>. This may be due to the fact that the criteria for evalua-



tion were strictly followed by both examiners.

The observation period of this study covered nine years. It was considered to be good. Strindberg<sup>(1)</sup> suggested that a four-year period after completion of endodontic therapy might be ideal period to evaluate such therapy and anything earlier might not be desirable. The American Board of Endodontics, however, accepted a one year observation for speciality board certification<sup>(15)</sup>. We believe that the observation period should be long enough to eliminate the risk of misinterpretation owing to incomplete healing. This means that a delay in healing in a case after a long observation should not be interpreted as a permanent failure.

Culture is used as a tool to determine the bacteriological status of the root canal system. Several investigators have recommended culture test during root canal therapy<sup>(5,9,16)</sup>. They pointed out the relationship between the culture results before obturating the root canal and the prognosis of the root canal therapy. Higher success rate had been reported when a canal is filled following a negative culture than when a positive culture was obtained<sup>(5,9,16)</sup>.

Despite the improvement in clinical techniques and materials,

we believed that the introduction and sustained use of root canal culture in endodontic therapy should be recommended especially for training institutions.

#### Conclusion:

The following conclusions can be drawn from the above study:

1- The success rate was 50.9% in 233 cases of root canal therapy followed up in King Saud University, College of Dentistry clinics over a nine year period. The failures and the uncertain cases accounted for the 49.1%.

2- There were no significant differences between age and sex of the treated patients.

3- There were no significant differences between the results of the RCT among male and female dental interns.

4- Over-filled canal had poor prognosis.

#### Summary:

A total of 233 endodontically treated teeth were evaluated for success or failure. The root canal therapies were done by the dental interns of King Saud University, College of Dentistry, Riyadh, during a 9-year period. Results revealed a success rate of 50.9% and 33.9% failure while 15.2% were questionable or uncertain. Age and sex



of the patient had no measurable effects on the result of the root canal therapy. No significant differences were found between the work done by the male or female dentist. Over-filled canal was shown to have poor prognosis.

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