

Retrospective Analysis of Faulty Endodontic Procedures among Insured Population in Hyderabad, Telangana, India

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Abstract

Original Research Article

Aim: Our aim was to assess the reasons for endodontic failure among insured population. **Objectives:** To assess the quality of treatments performed, their success rate and reasons for endodontic failure among insured population. **Material and Methods:** The study was conducted retrospectively among insured population in Hyderabad, Telangana, India. The patients who attended the Out Patient Department (OPD) of Employees' State Insurance Hospital, Sanath Nagar, Hyderabad were included. Records of 120 patients (involving 150 teeth) complaining of pain and/or swelling after endodontic treatment reported during a 2 year period, from June 2017 to June 2019 was utilized. **Results:** Age range of individuals in the study was 18 to 55 years and the average was 46.7 ±9.5 years. Out of them 80 (66.63%) were males and 40 (33.33%) were females. Poor prognosis cases were significantly higher in males (46.67%) compared to females (6.67). Fair prognosis cases were significantly higher in maxillary teeth (16.67%) compared to mandibular teeth (3.33%). The fair and poor prognosis cases in anterior teeth (5.33%, 3.33%) were significantly lesser than posterior teeth (14.67%, 50%). Similarly fair and poor prognosis tooth in younger patients aged 18-35 years (3.33%, 6.67%) were significantly lesser than older patients aged 36-55 years (16.67%, 36.67%). All patients were examined by experienced clinicians with minimum of 5 years experience. **Conclusion:** Re-treatments are a task however, not impossible. Amongst the cases categorized saved tooth were 46.67% by Retreatment with/without endodontic treatment and 53.33% of cases were relieved of their complaints after extraction. Understanding anatomy, reasons for endodontic failure, age of the patient, Clinical and radiographic diagnosis, use of advanced instrumentation, technique sensitivity and giving them realistic expectations would increase success rate. **Keywords:** Root canal treatment, faulty endodontics, Insured population, Dental treatment.

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INTRODUCTION

Endodontics is the branch of dentistry concerned with diseases and injuries of the soft tissues inside a tooth (the dental pulp). Endodontic treatment is divided into three main phases: Gaining proper access into the pulp space, shaping and cleaning of the root canal system, and obturation. This serves to remove infection, prevent recurrence of infection, and promote healing [1]. Following asepsis and high standards of treatment protocol success rate is as high as 94% [2, 3]. However, as a part of learning curve and patient's expectations, clinicians are motivated to try something beyond their competence and undergraduate training. This is the main reason for flare ups in dentistry.

Endodontic flare ups are one among them and have become quite common these days.

Here we intended to get statistical data on individuals who underwent root canal treatment and subsequently developed various complaints such as pain and swelling due to various reasons such as sinus opening, fistula, cyst, vertical fracture, perforation, furcation involvement, ledge formation, file separation, over obturation, under-obturation, improper sealer placement, apical transportation, improper crown preparation and coronal seal. These patients reported at varying intervals from the time of their root canal treatment. The aim and objectives of the present study

was to assess reasons for endodontic failure among insured population.

MATERIALS AND METHODS

The study was conducted as a retrospective study in which records of patients who had reported for treatment at the OPD wing of the Department of Dentistry, ESIC Medical College, Hyderabad during the period of June 2017 to June 2019 were utilized. Records of patients complaining of pain and/or swelling after endodontic treatment were included for the study. Clinical diagnosis was confirmed with radiographic aids (IOPA, OPG) and was saved in the records. Data were tabulated indicating age, gender, tooth involved, causes of failure of endodontic treatment and further treatment performed.

AAE (American Association of Endodontics) [4] guidelines for Retreatment of endodontically treated tooth, cases were categorized as Non-surgically treated and surgically treated depending on their prognosis. Rudd *et al.*, proposed classification system to assess outcomes for nonsurgical retreatment and surgical endodontics as complete healing, incomplete healing, uncertain healing and unsatisfactory healing [5]. Accordingly, depending on the prognosis the patients were categorized as having good, fair, or poor prognosis respectively retreatment of endodontically treated tooth, surgical endodontics and extractions were performed.

Factors considered for determining the prognosis are as follows

Good prognosis: (i) Incomplete treatment, (ii) missed canals, (iii) poor obturation, (iv) coronal leakage and (v) periapical lesion <5mm, as these can be corrected with retreatment procedures.

Fair prognosis: (i) Procedural errors such as perforation, apical transportation, ledging, loss of length, and separated instruments (ii) radiolucency >5 mm as these may not be correctable with a nonsurgical retreatment approach and are best treated with surgery.

Poor prognosis: (i) Vertically fractured crown and root, (ii) resorbed roots, (iii) Grade III mobility (iv) Patients unwilling for retreatment were subjected to extraction.

Routine procedure for ReRct was followed [6, 7]. Removal of Guttapercha solvent containing chloroform was used along with H-files and K files. Confirmation of GP removal was done with IOPA. Protapers F1,F2,F3 was used for Cleaning the canals, Sodium hypochloride for intracanal irrigation followed by Calcium hydroxide dressing and were recalled after 2weeks. Under aseptic conditions following the working length, Single cone guttapercha (GP) was placed and confirmed with radiograph to maintain working length and obturation was done. For retreatment involving surgical endodontics apicectomy along with cyst enucleation was performed. After apicectomy of 3mm, apex was sealed by heating GP and Glass Ionomer Cement restoration was done.

RESULTS

A total of 120 patients reported with a chief complaint of pain due to faulty endodontic procedures. However, among them 150 teeth had reported with failed endodontic treatment and data from the records of these 150 teeth were utilized for the final analysis. Among these 150 involved teeth, 80 (66.6%) were males and 40 (33.3%) were females. The participants were between 18 to 55 years of age, with mean of 46.7 ±9.5 years.

There was a statistically significant association between gender ($p < 0.0001$), arch ($p = 0.003$), tooth position ($p < 0.0001$), age ($p < 0.0001$) with various types of treatments performed. The poor prognosis cases were significantly higher in males (46.67%) compared to females (6.67%). The good prognosis cases were more of underobtured (16.67%) followed by incomplete obturation (6.67%) and underobturation (16.67%). They are often encountered in mandibular anteriors of age group 18-35 years. The fair prognosis cases were significantly higher in maxillary teeth (16.67%) compared to mandibular teeth (3.33%). The fair and poor prognosis were performed in anterior teeth (5.33%, 3.33%) were significantly lesser than posterior teeth (14.67%, 50%). The fair and poor prognosis performed in younger patients aged 18-35 years (3.33%, 6.67%) were significantly lesser than older patients aged 36-55 years (16.67%, 36.67%).

Table-1: Distribution of teeth based on gender

Arch	Teeth	Males	Females	Total
		N(%)	N (%)	N(%)
Maxilla	Anterior	9(6.00)	12(8.00)	21(14.00)
	Posterior	39(26.00)	16(10.67)	55(36.67)
Mandible	Anterior	8(5.33)	8(5.55)	16(10.67)
	Posterior	49(32.67)	9(6.00)	58(38.67)
Total		105(70.00)	45(30.00)	150(100.00)

Table-2: Distribution of patients based on type of endodontic failure

Prognosis of endodontic failure	Type of endodontic failure	N(%)
Good (n=40) (Non-surgical endodontic treatment)	Over-obturation	5(3.33)
	Under-obturation	25(16.67)
	Incomplete-obturation(Missed canals)	10(6.67)
Fair (n=30) (Surgical endodontic treatment)	Radiolucency >5mm	15(10.00)
	Perforation	5(3.33)
	Apical transportation	2(1.33)
	Ledge formation	3(2.00)
	Instrument separation	5(3.33)
Poor (n=80) (Extraction)	Vertical fracture	10(6.67)
	Mobility	45(40.00)
	Resorption	10(6.67)
	Not willing for ReRCT	15
Total (n=150)	Total	150(100)

Table-3: Comparison of various types of prognosis and treatments among males and females

Prognosis	Treatment	Males N(%)	Females N(%)	Maxillary teeth N(%)	Mandibular teeth N(%)	Anterior teeth N(%)	Posterior teeth N(%)	Age (18- 35 years)	Age(36-55 years)
Good (N=40)	Non- surgical endodontics	20(13.33)	20(13.33)	18(12)	22(14.67)	24(16)	16(10.67)	25(16.67)	15(10)
Fair (N=30)	Surgical endodontics	15(10)	15(10)	25(16.67)	5(3.33)	8(5.33)	22(14.67)	5(3.33)	25(16.67)
Poor (N=80)	Extraction	70(46.67)	10(6.67)	33(22)	47(31.33)	5(3.33)	75(50)	10(6.67)	70(46.67)
Total		105(70)	45(30)	76(50.67)	74(49.33)	37(24.67)	113(75.33)	40(26.67)	110(73.33)
Chi square value		25		16.1595		41.5406		36.0085	
P value		<0.0001*		0.0003*		<0.0001*		<0.0001*	

DISCUSSION

This is a retrospective study aimed to analyze the records of patients seen at Esic medical college and Hospital, Sanathnagar, Hyderabad from June 2017-June 2019. Subjects in study were in age group of 18 to 55 years, with mean of 46.7 ± 9.5 years which was little different to study conducted by Thomas Kvist *et al.*, [8] who had studied 97 cases to evaluate retreatment of endodontically treated teeth. Wherein the age was 17-75 years among them was 45 males and 47 females in their study. Gender distribution in our study was 80 (66.66%) males and 40 (33.3%) females which was different from the previous study. The poor prognosis tooth were significantly higher in males (46.67%) compared to females (6.67). This may be attributed to the fact that females are concerned and were approachable for further appointments as shown in Table-1.

The fair prognosis tooth were significantly higher in maxillary teeth (16.67%) compared to mandibular teeth (3.33%). This was probably due to rapid spread in cancellous bone, presence of canine space, buccal space in maxilla which causes more swelling and concern to the patient.

The fair and poor cases in anterior teeth (5.33%, 3.33%) were significantly lesser than posterior teeth (14.67%, 50%). It may be attributed to the fact that subjects might have reported early for treatment as

it is area of esthetics. The poor and fair prognosis tooth in younger patients aged 18-35 years (3.33%, 6.67%) were significantly lesser than older patients aged 36-55 years (16.67%, 36.67%) as shown in Table-3.

Frequency of distribution of teeth in present study was more in maxillary and mandibular molars range of 30% in each respectively, mandibular premolars 8.67%, maxillary premolars 6.67%, maxillary lateral incisors 6%, maxillary central incisors 7%, maxillary canine, mandibular central and mandibular canine occur in frequency of 3.33% each. This can be attributed to the facts that oral hygiene practices may be difficult in posteriors for the subjects and also its complex anatomy for the operator to achieve successful endodontic treatment.

Total 150 teeth records were obtained from the previous data available. They were categorized depending on their prognosis as Good, Fair, Poor prognosis as shown in Table-2.

Poor prognosis (N=80) were hopeless teeth which included -Vertical fracture (10%), Grade II, III mobility (45%), Resorption >apical $1/3^{\text{rd}}$ (10%) and subjects not willing for ReRct (15%) underwent extraction and after satisfactory healing, prosthesis was advised. Fair prognosis (N=30) - Perforation, apical transportation, file separation, ledge formation and radiolucencies caused due to overobturation,

underobturation and/or incomplete obturation >5mm were subjected to Retreatment of endodontically treated tooth with surgical intervention. Good prognosis (N=40) overobturation, underobturation and incomplete obturation with/without radiolucencies <5mm were treated by ReRct.

Categorizing the subject to surgical or Non surgical was important as they influence the treatment outcome. Size of periapical lesion >5mm or <5mm determined the Surgical or Non surgical treatment. As stated by Molven O *et al.*, [9] Non surgical decreases the success rate by 5%–21%. In same way subjects with apical periodontitis demonstrated a reduction in success of 13%–36% with non surgical management as per Van Nieuwenhuysen JP *et al.*, [10]. The size of the apical lesion might also have a deleterious effect on outcomes for endodontic surgery, with larger lesions being related to less favorable healing. Similarly none of our surgical patient's showed any signs of recurrence in 6 months follow up period.

According to Torabinejad *et al.*, [6] analysis evaluating success or failure rate of procedure was best to analyze clinical, radiographical and questionnaire method. We have followed up subjects and evaluated prognosis for a period of 6months. Subjects lost for follow-up or incomplete records were not included in the study.

Ruaa A. Alamoudi *et al.*, [11] also stated that 8.6% of cases of endodontic errors were caused due to under filling which was similar (16.6%) to our study in good and fair prognosis cases. A study conducted in 406 cases by peak *et al.*, Root fillings that were less than 2 mm from the radiographic apex had a higher success rate (88% overall) than those that were greater than 2 mm from the radiographic apex (77% overall).

After instances of underfilling, radiolucencies >5mm were (10%) more frequently observed in our study. This may be probably due to over-instrumentation and overobturation which may lead to periapical cyst formation due to apical transportation of bacteria resulting in chronic inflammation. The resultant inflammation leads to epithelial proliferation, necrosis and fluid accumulation resulting in a cystic cavity and cyst enlargement as stated by Vivekananda Pai *et al.*, [12].

CONCLUSION

Amongst the cases categorized 46.67% of cases were saved by Retreatment with/without endodontic treatment and 53.33% of cases were relieved of their complaints by undergoing extraction. The finding from the present study suggest that endodontic failures need not be a one way ticket to tooth loss. When properly studied and selected, teeth

with a history of endodontic failures can be salvaged and need not be always condemned for extraction. These factors can serve as a guide for the clinician to plan the treatment options for endodontic failures and present a realistic treatment plan to the patient.

Conflict of interest: None declared.

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