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Clinico-Radiographical Assessment of Efficiency of Cast Metal Post and Glass Fiber Post: An Original Research Study

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ABSTRACT

Aim: This clinico-radiographical assessment was conducted to evaluate the efficiency of cast metal post and glass fiber post. **Materials & Methods:** Total sixty grossly decayed teeth those indicated for post and core were selected for the study. All teeth were segregated into two major study groups of 30 each. First thirty sample teeth were restored with cast metal post (group one) and rest with glass fiber post (group two). Study had included sample teeth with single canal only. Both male and female patients were included in the study in the age range of twenty to thirty five years. Clinical symptoms related to coronal fracture, mobility, discoloration, aesthetic issues, cementation problems were evaluated for both groups. Radiological findings related to root fracture, peri-apical abscess, coronal fracture were also evaluated. P value less than 0.05 was considered significant ($p< 0.05$). **Results:** The data was subjected to appropriate statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Out of 60 patients, males were 32 and females were 28. Total 21 patients (maximum) were in age range of 20-23 years. P value was noticed to be significant here (0.01). In group I, clinical crown fracture was noticed in 4 teeth while the p value was highly significant. In group I, root fracture was noticed in 3 teeth while the p value was highly significant here. Peri-Apical Abscess was seen in only two teeth. In group II, mobility was seen in only one tooth. Discoloration was identified in 1 tooth wherein p value was significant (0.012). In group I, root fracture was noticed in 1 teeth while the p value was non significant here. Sign of coronal fracture was identified in 1 tooth wherein p value was significant. **Conclusion:** Nearly all studied clinical and radio-graphical factors have been noticed in post operative phases of both study groups. However, post and core therapy completed with cast metal post showed higher number of involved teeth compared to glass fiber post.

Key Words: Glass Fiber Post, Cast Metal Post, Mobility, Peri-apical Abscess, Root Fracture, Post and Core.

I. INTRODUCTION

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It's an established fact that endodontic treatment is widely used procedure in dentistry where infected pulp is removed and root canals are filled with inert non reactive restorative materials. Basically, any kind of dental caries and superadded fracture usually leads to pulpal infection resulting in significant tooth loss.[1,2,3,4] Therefore, full-coverage restorations are required after endodontic treatment of teeth to manage the condition. These restorations are highly imperative since there is significant loss of tooth structure which was erstwhile available for normal functioning.[5,6,7,8] So, post and core therapies are frequently required in these cases. Core is the part which enhances coronal portion while post restores radicular portion of tooth. Consequently post and core act to replace missing tooth structure which aids in retention and resistance form to final restoration. Posts are required for restoring such endodontically treated teeth to retain a core for definitive restoration. The principal aim of post and core procedure is to construct missing coronal structure as well as to offer adequate retention and resistance form to final restoration.[2,3,9,10,11] In early nineties, custom-made post and core restoration was one of the most admired methods to restore endodontically treated teeth. Later on, prefabricated posts gain value due to less time, esthetics and practicability. In recent days of advancements, different tooth-colored posts are achieving popularity due to enhanced aesthetics.[12,13] Universally known tooth coloured posts are glass fiber post, zirconia, and composite post. Fiber posts have an elastic modulus comparable to that of dentin. This characteristic has been shown to lessen tragic root fracture and offer superior stress distribution.[5,7,8,14] Moreover, glass fiber post can bond to composite core and retain strength and provides the most esthetic results. Therefore, keeping all these intermingling factors in the mind, this clinico-radiographical study was conducted to evaluate the efficiency of cast metal post and glass fiber post.

II. MATERIALS & METHODS

This study was abstracted, designed and executed to compare the clinical performance of cast metal post and glass fiber post. Total sixty grossly decayed teeth those indicated for post and core were selected for the study. To ensure the standardization and other study measures, authors had included sample teeth with single canal only. In case of multiple grossly decayed teeth indicated for post and core therapy in a particular patient, only one sample tooth was selected. Initially, biomechanical preparation and root canal treatment was completed with standard manner. All teeth were segregated into two major study groups of 30 each. First thirty sample teeth were restored with cast metal post (group one) and rest with glass fiber post (group two). Some of the clinical steps were similar in both groups like isolation measures and access opening. Any symptoms related to post operative analgesia was immediately addressed. Teeth with any sign of failure related to root canal treatment were excluded from the study. Both male and female patients were included in the study in the age range of twenty to thirty five years. The study was discussed and presented to ethical committee for clearance. Following approval, methodology of the study and study design was explained to all participating patients. Informed consent was obtained from all willing patients. Teeth with any related signs of gingival recession, attachment loss, clinical mobility, periodontal pocket, bleeding on probing, fracture, attrition, cervical erosion were excluded from the study. Other absolute criterions of exclusion were deciduous teeth, peri apical abscess, teeth with repetitive therapies, blocked root canals. Patients recalled after 10 days for clinical and radiographic assessment. Clinical symptoms related to coronal fracture, mobility, discoloration, aesthetic issues, cementation problems were evaluated carefully for both groups. Similarly, noticeable radiological findings related to root fracture, peri-apical abscess, coronal fracture were evaluated carefully for both groups. Results thus obtained was compiled and sent for basic statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

III. STATISTICAL ANALYSIS AND RESULTS

All the complied data and responses were entered into spreadsheet and sent for statistical assessment using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The substantial data was subjected to appropriate statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1 and Graph 1 exhibit that out of 60 patients, males were 32 and females were 28. Total 21 patients (maximum) were in age range of 20-23 years. P value was noticed to be significant here (0.01). 18 patients were identified in second age range of 24-27 years. 12 patients were seen in age range of 28-31 years. P value was non significant here. Minimum 9 patients were noticed in last age group of 32-35 years. P value was significant here (0.02). Table 2 demonstrates essential statistical description with level of significance assessment using pearson chi-square test [group I, n= 30 for clinical parameters only]. Clinical Crown Fracture was noticed in 4 teeth while the p value was highly significant here (0.001). Mobility was seen in only one tooth. Discoloration was identified in 2 teeth wherein p value was significant (0.005). Aesthetic Issues was seen in 3 teeth with significant p value. Cementation Issues was obvious in one tooth only. Table 3 demonstrates essential statistical description with level of significance assessment using pearson chi-square test [group I, n= 30 for radiological parameters only]. Root Fracture was noticed in 3 teeth while the p

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value was highly significant here (0.008). Peri-Apical Abscess was seen in only two teeth. Sign of Coronal Fracture was identified in 2 teeth wherein p value was significant (0.005). Table 4 demonstrates essential statistical description with level of significance assessment using pearson chi-square test [group II, n= 30 for clinical parameters only]. Clinical Crown Fracture was noticed in 1 tooth while the p value was highly significant here (0.001). Mobility was seen in only one tooth. Discoloration was identified in 1 tooth wherein p value was significant (0.012). Aesthetic Issues was seen in 1 tooth with significant p value. Cementation Issues was obvious in one tooth only. Table 5 demonstrates essential statistical description with level of significance assessment using pearson chi-square test [group I, n= 30 for radiological parameters only]. Root Fracture was noticed in 1 teeth while the p value was non significant here (0.088). Peri-Apical Abscess was seen in only 1 tooth. Sign of Coronal Fracture was identified in 1 tooth wherein p value was significant (0.005).

Table 1: AGE & GENDER WISE ALLOCATION OF PATIENTS

Age Group (Yrs)	Male	Female	Total	P value
20-23	12	9	21 [35 %]	0.01*
24-27	10	8	18 [30 %]	0.70
28-31	6	6	12 [20 %]	0.09
32-35	4	5	9 [15 %]	0.02*
Total	32	28	60 [100 %]	***p<0.05 significant**

Graph 1: AGE & GENDER WISE ALLOCATION OF PATIENTS

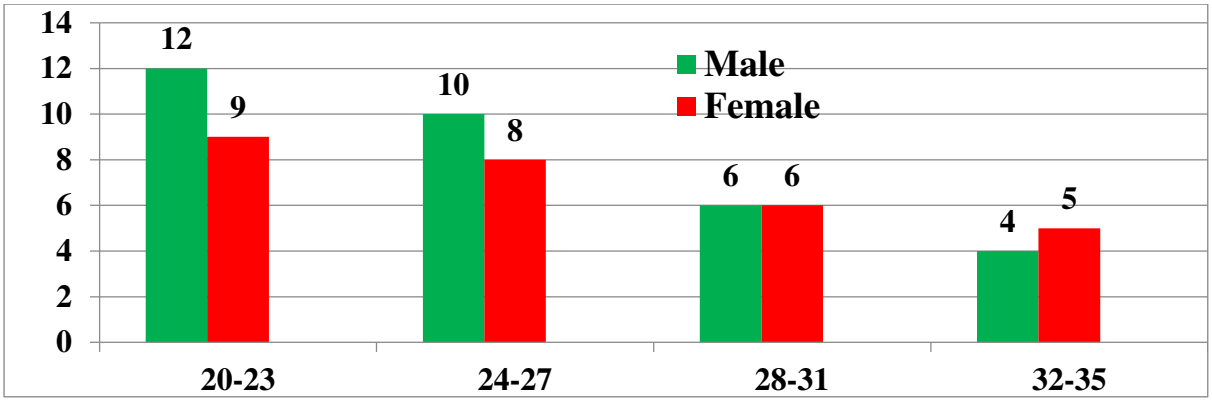

Table 2: FUNDAMENTAL STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP I, N=30 FOR CLINICAL PARAMETERS ONLY]

Parameters (Clinical)	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Clinical Crown Fracture	4	2.032	1.738	0.647	2.15	2.746	1.0	0.001*
Mobility	1	0.182	0.084	0.604	1.27	0.824	1.0	0.800
Discoloration	2	1.190	0.532	0.324	1.60	1.018	2.0	0.005*
Aesthetic Issues	3	1.732	1.949	0.584	2.22	1.595	1.0	0.009*
Cementation Issues	1	0.114	0.053	0.326	1.61	0.939	1.0	0.060
								***p<0.05 significant**

Table 3: FUNDAMENTAL STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP I, N=30 FOR RADIOLOGICAL PARAMETERS ONLY, *p<0.05 significant]

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Parameters (Radiological)	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Root Fracture	3	1.945	1.639	0.938	2.02	1.536	1.0	0.008*
Peri-Apical Abscess	2	0.985	0.202	0.643	2.19	0.854	1.0	0.100
Sign of Coronal Fracture	2	1.008	0.282	0.938	2.93	1.948	2.0	0.005*

Table 4: FUNDAMENTAL STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP II, N=30 FOR CLINICAL PARAMETERS ONLY, *p<0.05 significant]

Parameters (Clinical)	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Clinical Crown Fracture	1	1.031	1.023	0.394	1.02	2.546	1.0	0.001*
Mobility	1	0.984	0.042	0.097	1.12	0.033	1.0	0.500
Discoloration	1	1.097	0.937	0.043	2.34	1.043	2.0	0.012*
Aesthetic Issues	1	1.031	1.005	0.054	1.07	1.102	1.0	0.018*
Cementation Issues	1	0.098	0.003	0.748	1.21	0.152	1.0	0.200

Table 5: FUNDAMENTAL STATISTICAL DESCRIPTION WITH LEVEL OF SIGNIFICANCE ASSESSMENT USING PEARSON CHI-SQUARE TEST [GROUP II, N=30 FOR RADIOLOGICAL PARAMETERS ONLY, *p<0.05 significant]

Parameters (Radiological)	n	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Root Fracture	1	1.035	1.279	0.498	1.02	1.033	1.0	0.088
Peri-Apical Abscess	1	0.063	0.102	0.323	2.09	0.863	1.0	0.100
Sign of Coronal Fracture	1	1.091	0.142	0.721	1.91	1.019	2.0	0.005*

IV. DISCUSSION

In this third millennium, several treatment options are available to restore the grossly decayed or fractured crown. Few of the prominent modalities includes composite build up, veneers, full coverage crowns, post and core followed by crown, extraction followed by fixed prosthesis or implant.[15,16,17] The successful clinical execution of non vital teeth is not a miracle in modern dentistry. Previously pulpless teeth were simply extracted without a single thought of conservation. Root canal therapy has significantly lessened the probability of extraction.[18,19] Endodontic treatment followed by post positioning undoubtedly increase the overall success rate of non-vital teeth. Many of the literature have shown that an ideal post must be able to endure the maximum occlusal forces. Additionally, it must have an ability to adapt to different canals.[2,7,13,20,21,22,23] Core material must be biological attuned with physical properties similar to that of dentin. Different post like glass fibres posts, quartz fibre posts and zirconia posts are widely used. All have their own advantages and disadvantages. These posts offer sufficient retention and resistance to the remaining tooth structure.[24,25,26] Their ultimate capability to endure the forces and resistance to corrosion has made them popularized among practitioners. Many of the pioneer workers in the literature have stated that endodontically treated teeth have higher risk of biomechanical failure compared to vital teeth. Therefore, posts are needed for restoring such endodontically treated teeth to retain a core for final restoration.[27,28,29] The sole aim of post and core therapy is to fabricate missing coronal structure as well as to provide satisfactory retention and resistance to final restoration. Posts can be classified as custom made or prefabricated, metallic or non-metallic, flexible or stiff, esthetic or non-esthetic types. Literature

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has well evidenced that post and core interface is the most common site for tooth fractures. Fracture resistance of restoration with post is directly related to post design, post length, post diameter, core material, and type of cement used. Multiple risk factors, including pain due to over or under instrumentation, apical extrusion of infected dentin debris, irrigant, hyper occlusion, missed canal, and persistent peri-apical pathosis with preoperative pain have been studied to elucidate which factors could be correlated with the occurrence of postoperative complications.[30,31,32,33]

V. CONCLUSION

Authors have figured out very important clinical and radiographic presumptions in this study. Within the limitations of the study authors concluded that post operative clinical and radiographic dilemmas were present in both the studied groups. Almost all studied clinical and radio-graphical factors have been noticed in post operative phases of both study groups. However, post and core therapy completed with cast metal post showed higher number of involved teeth compared to glass fiber post. Therefore, glass fiber post is seems to have greater longevity with lesser failure. Our study results should be considered as suggestive for presuming prognosis for similar clinical circumstances.

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