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INTRODUCTION

The metal ceramic crown is indicated on the teeth that are grossly damaged. It also fulfills the esthetic demands. When the patient wants improved esthetics, it may be the choice of the clinician providing an excellent full coverage crown. If the esthetic requirements are high enough, an all-ceramic crown is a better option. It has an advantage over the metal ceramic crown while considering the esthetic. Though the metal ceramic crown has more strength, it has also significant ability to work as retainer due to having soldering capability to fixed dental prosthesis. The indication for the metal ceramic crown includes correcting the minor mal inclinations, recontouring the axial surfaces and treating the endodontically treated discolored teeth in conjunction with post and core. Metal ceramic crown is one of the most extensively used fixed restoration mode.

PORCELAIN METAL CERAMIC CROWN VERSUS PORCELAIN VENEER;

A CLINICAL TRIAL INVESTIGATING THE SUCCESS BETWEEN THE TWO IN THE MAXILLARY ANTERIOR TEETH

M. Rafi Ullah Awan¹, Hira Asghar², Hamid Raza³, Faiz Rasul⁴, Muhammad Safdar Baig⁵

ABSTRACT... Objectives: To evaluate the success of porcelain metal ceramic crown and porcelain veneer in endodontically treated maxillary central incisor having discoloration. **Study Design:** Experimental study. **Setting:** Akhtar Saeed Dental Hospital, Bahria Town, Lahore and de'Montmorency College of Dentistry, Lahore. **Period:** 1st January 2016 to 30th June 2016. **Patients and Methods:** This study includes 42 patients. All the patients had ages between 35-40 years and either gender. These patients had discolored endodontically treated upper central incisor. The patients were randomly divided into two groups to receive either the metal ceramic crown or the porcelain veneer. The restorations were given to the patients according to the following standard protocols. Follow-up examination was determined as set format of study. The results were compiled at the expiry of twelve months. **Results:** There were 27 females and 15 males. The result is obtained 1.1629 which is statistically not significant at $p < 0.05$. **Conclusion:** Being conservative in tooth reduction, veneer should be preferred while masking discoloration of single anterior tooth instead of full coverage metal ceramic crown.

Key words: Ceramic, Veneer, Adhesive Resin, Luting, Chamfer, Shoulder, Alloy.

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During a few past decades, a number of innovative materials have been developed due to improved advancements in biotechnology. The porcelain fused to metal crown includes a thin layer of porcelain that is fused to metal crown. This ceramic is micromechanically bonded to metal surface after being made rough by sand blasting procedure. This type of crown requires an extensive tooth reduction that has to accommodate both metal as well as ceramic. A specific ceramic thickness is needed to be placed over the metal crown to mask the metal colour. Since it requires much reduction of the tooth surface it is considered as least conservative approach. Currently available dental porcelains fuse at a temperature of about 960^o C. Due to this high temperature special alloys are needed to withstand at this high temperature. Metal ceramic crown has high strength. It has also good esthetic

aspect if fabricated carefully. There is also an excellent retention. The resistance form can be gained easily during the tooth preparation. As compared to all ceramic crowns, metal ceramic crown has slightly decrease esthetics. The metal ceramic crown has ability to bear high stress as compared to all ceramic crowns. Veneer is partially coverage restoration. It is an extra coronal restoration that covers only a part of the clinical crown. There are different types of veneers that are employed ranging from three quarter to seven eighth crowns. The three quarter crown can easily be fabricated for the posterior as well as anterior teeth. They are used in the anterior teeth to mask the discoloration and correction of contouring. The main advantage of this crown is the conservation of the tooth structure. Hence this conservation results in reduced pulpal and periodontal damage. Another advantage is ease of seating the restoration that can be directly observed while luting. Good Esthetics is main importance factor for the veneer. Metal ceramic crowns have a long history of success.¹

Porcelain margins were developed in 1960s and it went to the introduction of shoulder porcelains.² The recent developments of the opalescent and fluorescent porcelains has remarkably improved the esthetic demands of the patients.³ Metal ceramics are widely used where the clinician face high esthetic demands by the patients.⁴ There are a number of ceramic materials that are available in the market. Before placing the anterior ceramic crown a complete knowledge of parafunctional habits, bonding capacity and esthetics should be focused. Cyclic loading evidently reduces mean failure load of the all ceramic systems.⁵ The all-ceramic crowns have been observed to be more liable to fatigue than the metal ceramic crown.⁶ In a survey, it was observed that the patients preferred the all-ceramic single crown to metal ceramic crown with former being more natural looking and having excellent esthetics. However, the opposite was true in case of anterior fixed partial denture when metal ceramic was esthetically preferred.⁴ A number of studies have confirmed the excellent durability of porcelain veneer restoration.⁷ In this article, we tried to explore the best in terms of tooth conservation and esthetics between the

metal ceramic crown and the ceramic veneer in anterior teeth.

PATIENTS AND METHODS

This perspective study was carried out at Akhtar Saeed Dental Hospital, Bahria Town, Lahore and de'Montmorency College of Dentistry, Lahore from 1st January 2016 to 30th June 2016. A total number of 42 patients were included. All the patients had ages between 35-40 years and either gender. These patients had discolored endodontically treated upper central incisor. The chief complaint of the patient was the discoloration of the very tooth and wanted that to be masked in order to improve the esthetics. All the discolorations were moderate type grayish black. There were no parafunctional habits and the occlusion was normal. All other anterior teeth were normal with healthy periodontium. Oral hygiene was up to the mark and patients were briefed about the proper cleaning of the teeth at the time of restoration cementation. In addition radiographs were taken before the start of procedure to ensure a successful endodontics and nullifying presence of any periapical radiolucency or surrounding bone loss. The formal consent of the patients was taken. The patients contact information was recorded and all were requested for three follow-ups at four months interval for a period of one year. Clinical evaluation of the final restorations was done by the modified Ryge criteria.⁸

The patients were randomly divided into two groups to receive either the metal ceramic crown or the porcelain veneer. The veneer preparation of the tooth was done by the tapering diamond bur using air turbine and plenty of water irrigation. Whole of the facial surface was prepared with 0.7mm reduction in the incisal third and 0.5mm and 0.3mm reduction in the middle and cervical third respectively. This depth was achieved by the initial depth grooves that acted like a reference. The gingival margin was not placed more into the gingival sulcus. The interproximal extension was made just facial to the contact area. There was no unsupported enamel present. Due to esthetic considerations, the incisal edge was removed 1.5mm to 2mm in order to overlap the porcelain in this area. This was done to give improved esthetics.

The incisal edge was left flattened leaving a butt finish line configuration at the lingual surface. The preparation of the metal ceramic crown was done following the recommended guidelines. All the surfaces were prepared and got the resistance and retention form in the final configuration. The facial surface had a shoulder while the lingual surface margins ended in chamfer. The biologic width was preserved. At the end shade matching and selection was precisely measured. The restorations were cemented by the self-adhesive resin as luting materials. The data was entered and analysed in SPSS 20.

RESULTS

The Chi square statistic value we got with degree of freedom 1 (df) is 1.1629. The p- value is 0.280859. The result is not significant at $p < 0.05$. We find out that the value in the chi square chart is 3.841. Our statistical value is 1.1629 which falls below the value in the chi square statistical Table (Tables-I&II).

Category	Successful	Failure	Total
Metal ceramic crown	18	5	23
Procelain veneer	12	7	1
Total	30	12	42

Table-I. Frequency of successful and failure of patients

Method	Successful	Failure
Porcelain fused to metal crown	16.43 (0.15)	6.57(0.38)
Porcelain veneer	13.57 (0.18)	5.43(0.45)

Table-II. Calculation table with expected values and chi square statistic for each category

DISCUSSION

The currently innovated alloy materials have made it possible for certain precious as well as non precious metals to be used as restorations. These alloys are widely used in castings and are successfully fabricated for the fixed partial dentures and crowns. Our study mainly highlights the minimum preparation for the ceramic veneers and conventional full coverage metal ceramic crowns. The anterior teeth play a vital role in the esthetics while smiling or talking. The metal ceramic crown option for the single anterior tooth needs a more preparation as compared

to the ceramic veneers. These veneers require a nominal facial preparation that not only masks the discoloration but also it is highly accepted cosmetically.⁸ Porcelain laminate veneers were introduced for the first time nearly in 1938 and since that time, gained much popularity.⁹ The reason is the meeting of esthetic demands required by the patients. Zirconia ceramic has recently been emerged and is being used widely. This material has more strength and improved esthetics. Even there is no significant difference between porcelain fused to metal and zirconia fused to metal in terms of shear bond strength.¹⁰

The self adhesive resin used as cementing the restorations in our study gave an excellent outcome. No case was observed with the cementation failure throughout the study. This proves self-adhesive resin to be a good material as luting for both the metal ceramic as well as ceramic veneers. Brondani et al¹¹ showed that the self-adhesive resin is a good option for the cementation of the metal ceramic crown giving positively an excellent longevity. The design or geometry of the finish line matters most while tooth preparation. The lingual margin of the incisor preparation was kept chamfer with deeper margins into the sulcus. The advantage of the palatal chamfer preparation is that it preserves the enamel which is able to reduce the micro leakage in the palatal surface at tooth restoration interface and also counteracts the shear stress.¹² As briefed earlier that no cementation failure was observed, perhaps this might be the reason for the metal ceramic crowns for being retained successfully. Some studies support that the deeper chamfer result in the increased strength of the crown as well.¹³ Because ceramics are very hard and brittle so they can withstand with the load put on them. There is a little deformity observed before they are fractured.^{14,15} This is due to their brittle nature. In our study, there were two cases of metal ceramic crown while one case of ceramic veneer which fractured at the incisal edges due to excessive load applied.

Fracture is the most commonly observed complaint in case of ceramic restorations claim by Jettursson et al.¹⁶ Currently there is no

technique available in the laboratory that can be used as reference to determine the fracture of the ceramic material. All the in vitro methods used in the laboratory only give a clue about the fracture of the ceramic. So that it can be assumed that the very fracture resulted might simulate that of what happens in the oral cavity due to the periodic loading on the material.^{17,18} Hence the fracture obtained in the laboratory doesn't match the actual deformation undergoing in the oral cavity.^{19,20} Because it is physically very difficult to observe the results of the applied forces in vitro studies as do happens in the oral cavity during mastication. Among five failures of metal ceramic crowns, the three cases exhibited the caries recurrence. In porcelain veneers, four cases had caries recurrence while two cases had marginal discoloration. Since we covered the incisal edge in veneer, this might be reason for success as Smales et al²¹ concluded that success rate was 96% when the incisal overlap was made as compared to 86% without the incisal coverage. As far as our work is concerned, our study supports this evidence. In contrast to work of Newsome et al who mentioned that some failures have also been observed including the debonding, fracture, post operative sensitivity, discoloration and loss of marginal integrity.²²

We could not get any complaint of the post operative sensitivity debonding. Some of the ceramic veneers are very thin and a bit translucent. This translucency sometimes reflects the underlying tooth or the luting agent. If the highly discolored tooth is to be masked giving an excellent esthetics, then the choice of the luting agent also plays a handsome role in improving esthetics. We used the self adhesive resin in order to meet the desired criteria. Begum et al²³ speculated that masking the discoloration of tooth by the veneers depends upon the type of luting agent used and the thickness of the ceramic applied.

CONCLUSION

The study results highlight that the durability of both the restoration remains almost same hence, the result move on to find that the two categories are not statistically different. Porcelain veneer is

a good illustration of esthetics that got positive feedback from scratch. The anterior teeth are less bulky as compared to the posterior ones. Therefore, we may confidently claim that removing the less tooth structure while preparation is very beneficial for the patient. There are fewer chances of compromising the tooth strength and caries recurrence. It has also been observed that minimal preparation is the desire of most of the patients in case of anterior teeth. Thus, clinician's final choice should go parallel with the patient.

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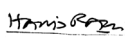

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	M. Rafi Ullah Awan	Data collection and compiling of results.	
2	Hira Asghar	Writing manuscript.	
3	Hamid Raza	Guidance in writing the manuscript.	
4	Faiz Rasul	Concept of the project.	
5	M. Safdar Baig	Review the article.	