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Management of Cohesive and Adhesive Fractures of Porcelain Fused Metal Crowns Using Ceramic Repair Kit : A Case Report

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KEYWORDS Ceramic Repair Kit, Cohesive And Adhesive Fractures , IVOCLAIR	ABSTRACT: Since porcelain has an enhanced attractive look and the metal has strong strength properties, porcelain fused to metal restorations are among the most often utilized restorations in fixed prosthodontics. Despite all of its benefits, there are also drawbacks, such as the ceramic cracking or breaking, exposing the metal. There are two ways to fix it: direct chairside repair and indirect laboratory repair. However, the indirect technique increases the risk of abutment tooth failure when removing the restoration. This case report aimed to present an integrated planning related to functional, aesthetic and emotional requirements from the patients. A 70-year-old male patient was presented with the chief complaint of chipping of ceramic layer when he bites. Upon investigation, it was discovered that the restoration was completed eight years prior, and
	there was a higher risk of abutment failure if the prosthesis was attempted to be removed. We intended to use the Ivoclair ceramic repair kit and did direct intraoral ceramic repair.

1. Introduction

Porcelain fused to metal restorations have been one of the most common restorations used in fixed Prosthodontics because of the high strength properties of the metal, casting accuracy. durability with added cosmetic appearance of porcelain [1]. Although porcelain or ceramic has been used extensively in dentistry, it has its own limitations and disadvantages [1]. Taking into considerations, the vast difference in modulus between metal and ceramic materials, there are high chances of mechanical failure of PFM system [2]. Clinically, such failures mostly began as porcelain fracture that may be caused by poor abutment preparation, inappropriate coping design, contamination, physical trauma, occlusal prematurity or technical errors [3]. Inspite of the advancements of dental materials in the strength of the bonding of PFM restorations, there are 5% chances of failure after 10 years of cementation [4][5]. Therefore, failures in porcelain are fairly common and have been reported in the range of 2.3% - 8% and are said to be the second greatest cause of failure after caries [6][7]. These failures may be classified as: -

1) Simple (involving only porcelain body),

2) Mixed (associated with exposure of metal and porcelain)

3) Complex (with substantial metal exposure) [2] It may be looked-for to repair a broken retainer of a fixed prosthesis rather than to remove it and taking risk as there is possibility that the entire restoration may get destroyed or the abutment teeth may get damaged [1]

Case report

A 70-year-old man came in with the main complaint of ceramic chipping off the PFM crown. Upon investigation, it was discovered that the patient had completed the prosthesis eight years prior. It was also discovered that the crown was a joint crown, and removing it would needlessly damage the abutment tooth. Subsequently the treatment plan was modified to use the IVOCLAIR intraoral ceramic repair kit to fix the prosthesis.

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Figure 1: Pre op view showing fracture irt 41



Figure 2: pre op view showing fracture irt 13

The patient was a known bruxer as well. The treatment regimen and maintenance therapy were explained to the patient. Since both the metal and ceramic layers are fractured, i.e., both cohesive and adhesive fracture it should be treated in an appropriate way.



Figure 3 : Ivoclair ceramic repair kit

The Ceramic Repair System Kit consists of the following components:

- 1. Tetric EvoCeram® a light-curing nano-hybrid composite
- 2. IPS Empress Direct® Opaque a light-curing opaquer suitable for masking exposed metal surfaces
- Monobond® Plus a primer designed for establishing an adhesive bond between luting composites and all indirect restorative materials
- 4. Heliobond a light-curing bonding agent.



Figure 4 :monobond is carried in applicator tip



Figure 5: monobond applied in the respective site



Figure 6: heliobond carried in applicator tip



Figure 7: light curing for 10 sec



Figure 8:application of opaque to mask the metal

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Figure 9 : composite added in increments and cured and finishing and polishing done

Usage is according to the IVOCLAIR'S guidelines

- 1. Its necessary to isolate properly Getting the metal surface readyUse water irrigation, roughen the surface of any exposed metal using a diamond or corundum grinding tool.As an alternative, use an intraoral sandblasting instrument (per manufacturer instructions) to roughen the metal surface.
- 2. Getting the damaged ceramic or composite surface readybevel the borders of the damaged ceramic or composite surface (1-2 mm) with a fine-grained diamond grinding tool.
- 3. Monobond plus Apply Monobond Plus with a brush to the exposed metal, ceramic, and composite surfaces, then wait 60 seconds for it to react. Then, use oil-free air to dry. (Avoid rinsing with water.)
- 4. Applying Heliobond
- Over the entire surface that needs to be fixed, apply a thin layer of Heliobond. Utilizing compressed air, eliminate any surplus. Then, light-cure for 10 seconds.
- 5. Applying the opaquerOn the metal surface that has been prepared, only apply IPS Empress Direct Opaque. The maximum thickness of the applied layer should be 0.5 mm.Next, let it light-cure for 20 seconds.
- 6. Employing Tetric EvoCeram to restore the restorationUse an appropriate equipment to adjust the material and apply Tetric EvoCeram in maximum 2 mm increments. Light-cure each layer individually for 10 seconds.
- 7. Finishing and polishingUsing an appropriate finegrained diamond grinding tool, remove any excess.

After completion high points were checked and corrected and patient was adviced with 2mm hard splint for the management of bruxism.



Figure 10 : post op view showing repaired 41



Figure 11 : post op view showing repaired 13

3.Discussion

Fracture may result from trauma, fatigue, occlusal prematurity, parafunctional habits, poor abutment inappropriate preparation, coping design and incompatibility of coefficient of thermal expansion between ceramic and the metal structure [6]. The recently introduced repair systems contain 10methacryloyloxydecyl dihydrogen phosphate (MDP), which recommends physical alteration of ceramic and metal substrates in conjunction with chemical agents such as metal primer, ceramic primer and improved silane coupling agents to promote adhesion of resin to fractured metal-ceramic restorations. The wide range of bond strength values from 3 to 37.4 MPa have been documented for repair systems in the literature [8]. It is evident from data available in the literature that anterior metal-ceramic restorations are more prone for fracture [9]. For a dental metal ceramic prosthesis to be successful both functionally and aesthetically, the metal-ceramic (MC) bond interface is essential. The metal-ceramic bond's strength is determined by four factors:

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1. Chemical bond: determined by the oxide layer on the metal substrate, which combines with oxides in the opaque ceramic to generate covalent, ionic, and metallic bonds.

2. Mechanical interlocking: undercuts on the metal substrate surface that are physically engaged by the ceramic.

3. Van der Waals forces: molecular charge-based attraction.

4. Compressive forces: those that rely on the thermal expansion coefficient.

4.Conclusion:

The most popular material for crowns and bridges is PFM restorations. In addition to saving the abutment tooth, using a ceramic repair kit to fix the ceramic also shortens the patient's treatment time and waiting period. Using the repair kit precisely and appropriately will enable us to provide a satisfying treatment in the dental office itself.

Refrences

- 1. Strub JR, Stiffler S, Schärer P. Causes of failure following oral rehabilitation:Biological versus technical factors. Quintessence In 1988;19:215-22.
- 2. Moaleem MM, Ahmari NM, Dosari MK, Abdulla HA. Repairing of fractured metal ceramic restorations techniques review. Int J Contemp Dent 2013;4:21-30.
- Chung KH, Hwang YC. Bonding strengths of porcelain repair systems with various surface treatments. J Prosthet Dent. 1997 Sep;78(3):267-74.
- Darban JG, Goharian RK & Kardan ZA: In-. Vivo Evaluation of Durability of Intraoral Porcelain. Repair. J Dent Res (2003);76:454.
- 5. Burke FJ. Repair of metal-ceramic restorations using an abrasive silica-impregnating technique: two case reports. Dent Update. 2002 Oct;29(8):398-402.
- Haselton DR, Diaz-Arnold AM, Dunne JT Jr. Shear bond strengths of 2 intraoralporcelain repair systems to porcelain or metal substrates. J Prosthet Dent 2001;86:526-31.
- GaliatsatosAA. An indirect repair technique for fractured metal-ceramic restorations: A clinical report. J Prosthet Dent 2005;93:321-3.

- dos Santos JG, Fonseca RG, Adabo GL, dos Santos Cruz CA. Shear bond strength of metal-ceramic repair systems. J Prosthet Dent 2006;96:165-73.
- Ozcan M, Niedermeier W. Clinical study on the reasons for and location of failures of metal-ceramic restorations and survival of repairs. Int J Prosthodont 2002;15:299-302.