

Complete Dental Rehabilitation Utilizing Removable Partial Dentures And Monolithic Zirconia Crowns (CASE REPORT)

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ABSTRACT:

Bilateral edentulous areas are a common clinical presentation, and in most of those cases, implant repair may not be possible. As a result, the conventional metallic partial denture is still in use. As our awareness of appearance has grown in our daily life, esthetics became a crucial component of dentistry. consequently, patients ask for aesthetic restorations that also maintain functionality. Zirconia is a widely used material for both functional and aesthetic demands. It has been demonstrated that zirconia can endure occlusal and functional stresses without neglecting the aesthetic appearance that is expected of a tooth-colored restoration. which is why using it as surveyed crowns to support partial dentures is optimal.

KEYWORDS:

zirconia, partial denture, surveyed crowns.

1. Introduction

Patients are usually penchant for high expectations toward the dental field, as gaining the optimum function and aesthetics. (1, 2)

A point of endless turn, dentistry always evolves around having the maximum benefit of every material and method. For example, Usage of ceramo-metal restorations is widely acceptable for its strength and its marginal integrity. However, it became of less demand and choice for its poor aesthetics. (3)

As a result, zirconia ceramics have found widespread application in prosthetic and restorative dental care, particularly in complicated

situations requiring both functional stability and an aesthetic result for the anterior zone. (4)

Clasp-type removable partial dentures are supported by fixed partial denture retainers or crowns, known as surveyed crowns. A crucial component of combining fixed and removable prosthodontics is the surveyed crown. Techniques for building every type of ceramic crowns studied with CAD-CAM systems, have been identified. (5-7)

Abutments of removable partial denture with zirconia guiding planes and rest seats have been reported. (8) Survey crowns should assist in distributing denture force on abutment teeth to have longer lifetime of the supporting structures and partial dentures. (9)

A rest seat is intended to provide a direct occlusal and masticatory stresses toward the long axis of the abutment tooth and vertical support in order to support the cast rest section of the partial denture framework. (10)

For effective stability of supporting structures, retention, and masticatory force transmission, consideration should be given to abutment tooth form and design as well as rest seat preparations. (11)

The entire mouth rehabilitation procedure is described in the case report that follows: Crowns made of full anatomic monolithic zirconia were used to restore the anterior teeth. To replace the lost posterior teeth, a removable partial denture with a cast clasp type was given.

2. Case and method

The comprehensive clinic at the college of dentistry Arab Academy for Science and Technology,

Alamein campus, received a referral for a 31-year-old male patient. The patient's primary complaints were of poor aesthetics due to severely decayed teeth on the anterior side and poor function and eating abilities on the posterior side because of several posterior tooth roots remaining. The preoperative mandibular and maxillary arches showed the condition (Fig. 1). Radiography, mounted diagnostic castings, extra and intraoral exams, and history taking, A treatment plan was established following initial examinations and all diagnosis required.

23 as well as the elimination of caries in addition to composite fillings in teeth #46, 45, 36, 37, 35, 26, 27, and 18. To preserve the VDO, a transitional denture was constructed before the crown was prepared and implanted at the intended vertical dimension. The procedure involved building up the post and core, then preparing the crowns for teeth #13, 12, 11, 22, 23, and #17 that had overexpanded, as well as #43 and 45 that replaced missing #44. To accommodate the zirconia crowns, a subgingival radial shoulder finish line with rounded internal line angles was used (12) (Fig.2).



Fig. 1. Preoperative intraoral imaging



Fig. 2. Maxillary anterior teeth preparations

The recommended treatment plan for the maxillary anterior teeth was post and core buildup, then fully covered by aesthetic ceramic single crowns. The maxillary posterior roots that remained were removed, and a number of replacement options were evaluated. The patient preferred not to have dental implants as their first option for replacing lost teeth, because they were unwilling to undergo surgery and because they were pressed for time and money.

The mandibular anterior teeth underwent supra and subgingival scaling, and stain removal. Composite restorations were used to reconstruct the carious posterior teeth in the mandible. To restore the maxillary posterior teeth, a cast clasp conventional removable partial denture was chosen. Phase I: Examinations, diagnosis, and completing the treatment plan, the patient received instructions on oral hygiene, scaling, polishing, and extraction of hopeless teeth.

Phase II: The control of disease phase included endodontic treatment for teeth #13, 12, 11, 21, 22, and

23 as well as the elimination of caries in addition to composite fillings in teeth #46, 45, 36, 37, 35, 26, 27, and 18. To capture the patient's anterior guidance and mandibular arch as accurately as possible, the PVS putty and wash impression technique was used to create the final impression for the maxillary arch. once the transitional denture was in place, bite registration with additional silicone PVS was done. The use of lab fabrication enabled the production of PMMA temporary restorations.

Phase III (restorative phase): Maxillary crowns were designed with computer assistance: Following the pouring of the model, a virtual model of the prepared arches was acquired using a Ceramill® Lab 600 desktop bench scanner. The following recommendations were followed in the design of the crown retainers and the rest seat preparations (19, 20, 21). Rest seats: Occlusal rest: rounded corners, triangular in shape, floor angled in the direction of the center, limited to 1/3 of the occlusal surface, 2.5 mm at the marginal ridge 0.8 mm cingulum rest: a V-shaped seat that extends mesiodistally along the diameter of the crown, 1 mm deep, and situated above the cingulum convexity. Guiding planes: Depth of 0.5 mm the emphasis was on undercuts

for clasping.

After that, the crowns were milled using Ceramill® Therm 3 and the following supplies: For the Anteriors in the maxilla: Zolid fx ML 0/A1 Super Translucent Pre-Shaded blocks (shade A3) Regarding premolars and canines: High translucency, full anatomic monolithic Zolid HT A3 RelyXTM Unicem 2 Self-Adhesive Resin Cement, 3M, USA) is a self-adhesive, dual-cure resin luting cement that was used for the adhesive cementation of the maxillary surveyed crowns. Before final impressions utilizing PVS impression material were obtained in the cast, surveying, RPD drawings of the maxillary arch, documentation for a work authorization, and rest seat preparations were finished. Bite registration, facebow, and metal try-in for a partial denture. Try in wearing a partial denture with acrylic teeth. Final insertion of the maxillary prosthesis (Fig. 3).



Fig. 3. Final crowns

To eliminate any high points, the necessary occlusal adjustments were made, and equal, consistent-intensity contacts were made. The patient received instructions for post-insertion on how to insert the prosthesis, remove it, chew food, and maintain cleanliness (Fig. 4).



Fig. 4. Extra-oral views before and after insertion

Phase IV: Recall and follow-up appointments were scheduled every week, every month, every three months, every six months, and every year.

3. DISCUSSION

The procedure presented has proven to be an effective choice in circumstances where there is a need for a harmonious combination of functional posterior tooth replacement with anterior region aesthetics (13).

Implants have historically been the preferred method of replacing lost posterior teeth, particularly in cases involving distal extension. However, in this instance, the patient's reluctance to undergo any kind of surgical intervention and financial limitations made implants impractical.

Zirconia's superior mechanical and aesthetic qualities have led to its widespread acceptance as a PFM substitute. As a result, zirconia has been chosen as the preferred material in order to satisfy both the functional forces resulting from the metallic RPD and the aesthetic requirements. (14)

When rest seats are placed within restorative materials or enamel like amalgam or composite, they are considered stable. However, while designing a monolithic ceramic crown, the rest seat design must be appropriate and robust enough because of ceramic materials properties, especially their fragile nature, mostly for their shape that do not fit the rest seat very well. (15)

The tensions created around the surfaces of the rest may be impacted by the way the rest seat floor is designed. (16, 17)

Furthermore, the crown material thickness is a crucial consideration in assessing the fracture strength of monolithic crowns. According to Lan et al. (18) an implant-supported zirconia crown could withstand cyclic fatigue loading at an axial and 10-degree oblique load with a nonanatomic crown thickness of 0.7 mm. the preparation of occlusal rest seat with a depth of 0.9 mm was taken into consideration in this case. All internal line angles have been rounded to ensure that there are no concentrated areas of stress.

Manchester et al. (19) proposed that the fracture resistance and strength of the examined crowns are significantly influenced by the rest seats shape. When it comes to removable partial dentures, rounded cingulum rest seats offer better fracture resistance than steeply angled seats in CAD-CAM evaluated crowns. According to Tanaka et al. (20), zirconia crowns have a hardness that is actually even higher than Co-Cr crowns, making them acceptably resistant to the friction exerted by the clasps during prosthesis insertion and removal. This information relates to the ability of zirconia crowns to withstand the forces generated by clasp arms.

Furthermore, the clasp arms retentive force in metallic and zirconia crowns was equivalent. Regarding the partial denture stability and retention, no issues have been recorded. During recall sessions, a clinical examination revealed no abnormalities related to the gingival health, zirconia crowns, or RPD.

4. CONCLUSION

The recommended course of treatment in the case at hand has shown to be dependable and effective. It is reasonable to speculate that zirconia will be the gold standard in the field of dental restorations. Going forward, a viable dental strategy is to combine the traditional RPD with modern ceramic restorations like zirconia and CAD/CAM technologies. It is advised to use long-term clinical applications to better objectively assess the outcomes of this case.

CONFLICT OF INTEREST:

There are no conflicts of interest, according to the writers.

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