



ESTHETIC REHABILITATION OF ANTERIOR MISSING TEETH WITH RIDGE DEFECT USING ZIRCONIA FIXED PROSTHESIS-A CASE REPORT

Dental Science

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ABSTRACT

The dentist should not only think of preventing oral diseases but should also fulfil the demands of the patient, and esthetics is the most important amongst other demands. Despite many recent advances in aesthetic dentistry, certain cases still remain difficult to restore. Replacing missing anterior teeth presents a serious challenge to the clinicians especially with a large ridge defect. Such cases require not only replacement of the missing teeth but also the restoration of the bone defect, aesthetics and phonetics. Need for esthetic restorations have resulted in use of dental ceramics for restoring anterior and posterior teeth. Earlier, use of all-ceramic restorations was limited only to the anterior teeth but now, it can be used for posterior teeth as well due to increased strength. The traditional ceramics have certain drawbacks in their physical and mechanical properties. To overcome such shortcomings, newer ceramic materials and techniques are emerging. Zirconia is one of these modification. Based on patient's esthetic demand, the choice of material to be used has vividly moved to "metal-free" wherever promising. Zirconia is precisely an oxidized metal, considered metal-free, giving better esthetic results, thus fulfilling the need of the patient and the dentist.

The aim of this case report is to describe an innovative approach of managing a patient with missing anterior teeth and ridge defect using zirconia fixed prosthesis.

KEYWORDS

Edentulous, Fixed Partial Denture, zirconia, labial bone defect, Esthetics.

INTRODUCTION

Smile and face in harmony are fundamental in facial esthetics from increasing the self-esteem and well-being of the individual.[1] Esthetics of smile is based on a proper position of the lips, gingival tissue condition, color, shape, and teeth position.[2-5] Thus, an integrated assessment of each component should be performed when the prosthetic rehabilitation is necessary.[3,4] Rehabilitation of maxillary anterior teeth requires professional comprehension of the natural dentition aspects and a careful rehabilitation plan. This plan includes a clinical and radiographic examination, study models with diagnostic waxing, and multidisciplinary approach cooperation with the aesthetic rehabilitation.[6-9] The selection of proper materials and techniques which makes it possible to reach an optimal esthetic result should be carried out in order to get prosthesis as close as the natural dentition. Advancement of ceramic systems, allow the prosthesis with aesthetic and long-lasting results. Zirconia ceramic system allows fixed prostheses, with excellent cosmetic results[10]. These are an excellent alternative to fixed prostheses with metal infrastructure.

CASE REPORT

A 22 year male old patient reported to the Department of Prosthodontics, Yenepoya Dental College with the chief complaint of missing teeth in upper front region of the mouth since last 6 months. Patient gave history of road traffic accident 6 months back and extraction was done for the same due to mobility in the upper anterior teeth. (figure 1)



Figure 1: Preoperative

On clinical examination there was partially edentulous space seen with respect to 21,22 and spacing with upper and lower anteriors. The labial cortical plate was fractured in the upper anterior region with ridge defect (siebert's class I defect) [Figure2].



Figure 2a: Intraoral Frontal view



Figure 2b: Right lateral intraoral view



Figure 2c: Left lateral Intraoral view

Pulp vitality test was carried out which showed that all the maxillary teeth were non-vital. Thus root canal therapy (RCT) was done in relation to all the maxillary incisors. Radiographic examination was done using Orthopantomograph (Opg) as well as Cone beam computed tomography (cbct), which showed that 21 had a labiopalatal width of 5mm and the height of residual alveolar ridge from crest of ridge to floor of nasal cavity was 11.9mm and 22 had a labiopalatal width of 4mm and the height of residual alveolar ridge from crest of ridge to floor of nasal cavity was 11mm. [Figure3]. As the patient had higher demands for esthetics, so the treatment option with implants

was explained but due to financial constraints he asked for an alternative. Thus the treatment plan was to replace the missing 21 and 22 with a zirconia based Fixed Partial Denture along with gingival porcelain to cover the ridge defect and restore the esthetics, after a root canal treatment for non-vital anterior teeth.



Figure 3a: Orthopantomograph (OPG)

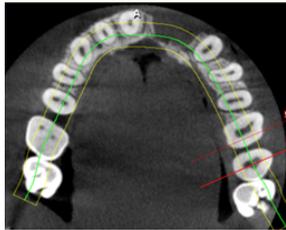


Figure 3b: Cone beam computed tomography (Cbct)

Objectives of the treatment
The objective of the treatment was rehabilitation of the partially edentulous space along with ridge defect (siebert's class I defect) using zirconia fixed partial denture and gingival porcelain to achieve maximum prosthesis stability, comfort, function and esthetics.

Clinical procedure

The whole procedure along with its advantages and disadvantages was explained to the patient and an informed consent was taken. RCT was done of all the nonvital teeth with respect to 11, 12 and 13. The diagnostic impressions of maxillary and mandibular arches were made using irreversible hydrocolloid impression material. (figure 4).



Figure 4: Diagnostic casts

The master casts were poured with dental stone. The facebow transfer was performed. Lateral and protrusive records were made, followed by articulation in semi-adjustable articulator (Artex CP articulator). The articulator was programmed using the records. The wax up was done to visualise the final outcome. (figure 5)



Figure 5a and b: Diagnostic wax up

The selected abutment teeth (13, 12, 11, and 23) were prepared to receive zirconia FPD along with gingival porcelain to fill the labial cortical plate fracture. Teeth preparation was done followed by proper isolation and gingival retraction technique using impregnated gingival retraction cord. The impression was made using single step putty wash technique where in the light body impression material was syringed around the margins of the teeth followed by impression using putty material loaded in the stock tray. Margins were carefully examined in

the impression to ensure no voids and drags. The final impression was poured using Die stone.

The mastercasts were scanned using Ceramill Map400 scanner followed by CAD/CAM designing using Exocad software on Ceramill by Amann Girrbach (Austria). The Zirconia framework designing was done keeping in consideration the ridge defect, with respect to 21, 22. An overall cutback of 1 mm on the zirconia coping was given in the design to accommodate low fusing ceramics (Emax) all around the framework keeping good clearance from the opposite antagonist. Once designed, the framework was nested into Zirconia Blank (AmannGirrbach) of 16mm, values were calculated & later transferred into Ceramill Motion 2 milling machine for processing. (Figure 6)

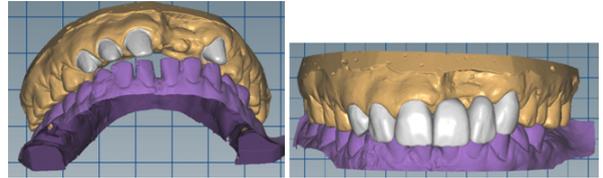


Figure 6: CAD/CAM designing

Once the milling was done it was put into sintering furnace under standard temperature cycle for Zirconia. Later on Emax Ceramic build-up was done of the framework, also using gingival ceramic of similar shade on the ridge defect areas. (Figure 7a and b) Cementation of the final prosthesis was done using resin cement (RelyX U200) (figure 8). Patient was very happy and satisfied with the final outcome.



Figure 7a: Emax ceramic buildup.



Figure 7b



Figure 8: Postcementation



Figure 9: Postoperative

DISCUSSION

Congenitally or traumatically missing anterior tooth may result in impairment of esthetics, speech and function. Several treatment options are available for replacing anterior tooth which includes implant supported single crown, conventional FPD, Resin bonded FPD (RBFDP) or RPD [9]. Conventional FPD which requires support from adjacent abutments is the most common treatment modality for replacing missing tooth but in certain clinical situations where the primary abutments are weak, the need for secondary abutments for the support, for success of FPD preclude the use of conventional PFD. Although implant-supported prosthesis do not require involvement of teeth adjacent to the edentulous area(s), the availability of bone volume in the edentulous region, occlusal function, systemic disorders, and socioeconomic status of patients are specific considerations that may preclude this approach [10].

RBFPD is also considered successful in certain clinical situations with short edentulous span, vital and intact abutment and minimal dynamic occlusal contacts on the abutment teeth [3]. But the esthetic concerns of the patient about the display of metal retainers of RBFPD may preclude this approach for replacing missing teeth.

Rehabilitation plan involving anterior teeth requires proper planning regarding, the analysis of all esthetic parameters. Knowledge about the principles of esthetics of natural smile and how to apply them in oral rehabilitation is crucial for successful therapy. The contrast between form, color and texture of the teeth in harmony with gums and lips to create an esthetic composition should be the major goal of prosthetic rehabilitation. Keeping interdental papilla and gingival health as a frame to the teeth is an important aesthetic aspect to be considered during diagnosis and treatment.[15] Changes in gingival contour and color, as the marginal height or the presence of black spaces between the incisors, related to the absence of interdental papilla may endanger the esthetics and harmony of smiling.[16] Absence of a papilla can also result in phonetic problems and food impaction.

Furthermore, to achieve an optimal aesthetic result it is necessary to follow a treatment protocol, including photographs, radiographs, diagnostic waxing and studying models. Thus, a proper diagnosis of the case must be done. Also proper clinical steps such as the correct teeth preparation, temporary restorations adjusted aesthetically, serve as prototypes for the final ceramic prostheses and become helpful guidance for the technical professional. The current esthetic pattern requires materials to have a clinical performance closer to the natural tooth. Thus, metal-free ceramic prosthesis replacing the metal ceramic fixed prosthesis have become a biomechanical and esthetically viable option.[17] Zirconia-based all-ceramic restorations provide with a better alternative to metal-based restorations due to its excellent clinical performance by virtue of its highly esthetic nature, superior mechanical properties, and compatibility with the oral tissues.[20] Properties that make zirconia the material of choice for fabrication of crowns in fixed partial prosthesis are its esthetic nature, high mechanical strength, toughness, corrosion resistance, resistance to altering temperatures and excellent compatibility.[21]

CONCLUSION

Zirconia ceramics have the added advantages of superior esthetics, biocompatibility, and excellent mechanical properties. With the help of digital technology, zirconia ceramic systems have gained improved accuracy and marginal integrity thus enhancing the esthetics of the prosthesis. This has made it possible not only to replace the metal-based restorations but also to meet the needs and demands of patients seeking oral care.

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