ISSN: 2582-9904

CASE REPORT

An Alternative Minimal Invasive Approach to a Conventional Fixed Partial Denture – A Case Report

Rohit M [a], Ponsekar Abraham [b], Eswaran B [c]

ABSTRACT

Consideration of a fixed prostheses for replacing a single missing tooth can be accomplished by a traditional fixed partial denture or an implant crown or a fiber reinforced partial denture or an inlay retained fixed partial denture. The main drawback in a traditional fixed partial denture is the removal of a significant amount of tooth structure in order to replace the missing teeth which contradicts De Vans dictum. The more conservative approach to replacing a single missing tooth is either by a fiber reinforced composite bridge or an inlay retained fixed partial denture. New high strength ceramics, with their stiffness and high mechanical properties (i.e., resistance to fracture and/or fatigue), could be considered a right choice in an IRFDP (Inlay retained fixed partial denture) rehabilitation. This case report describes an IRFDP treatment using a CAD/CAM monolithic zirconia for replacing a single missing mandibular molar.

Keywords: Adhesive dentistry; Inlay retained fixed partial denture; Preservative approach; Prosthodontics preservation.

How to cite this article: *Rohit M, Ponsekar Abraham, Eswaran B. An alternative minimal invasive approach to a conventional fixed partial denture – A case report. J Clin Prosth Impl 2022;4(1):18-20.* ***https://doi.org/10.55995/j-cpi.2022005***

INTRODUCTION

Consideration of a fixed prostheses for replacing a single missing tooth can be accomplished by a traditional fixed partial denture or an implant crown or a fiber reinforced partial denture or an inlay retained fixed partial denture. The main drawback in a traditional fixed partial denture is the removal of a significant amount of tooth structure in order to replace the missing teeth which contradicts De Vans dictum. In conventional full-coverage FPDs overall calculated tooth substance removal of 63% to 73%.[1] There are also chances of compromising pulp vitality when a significant amount of tooth structure is removed in the case of mesially tilted abutments, thereby leading to harmful pulpal reactions in the long term.

An implant may be the ideal treatment of choice to replace a single missing tooth so as to achieve the best esthetics and masticatory efficiency, however patients may express reservations about this option as it is a minor surgical procedure.The more conservative approach to replacing a single missing tooth is either by a fiber reinforced composite bridge or an inlay retained fixed partial denture. The major risk factors for damage to FRC bridges are occlusion and limited vertical space. The forces of mastication in the molar region may range between 441 N and 981 N. According to Zhang et al, FDPs should withstand occlusal forces of more than 1000 N in a static fracture resistance test.[2] New high strength ceramics, with their stiffness and high mechanical properties (i.e., resistance to fracture and/or fatigue), could be considered a right choice in an IRFDP (Inlay retained fixed partial denture) rehabilitation.[3]

CASE REPORT

A 32 year old patient reported to the department of prosthodontics with a chief complaint of a single missing posterior tooth wanting to get it replaced. The patient presents with a missing 46, restored 45 and mesially tilted 47 (*Fig 1*). The treatment option explained to the patient was a modified inlay retained fixed partial denture so as to preserve as much as tooth structure as possible.

Fig 1: Pre-operative intraoral view of missing 46.

[a] Assistant Professor, Department of Prosthodontics, S.R.M. Dental College Ramapuram
[b] Professor and Head, Department of Prosthodontics, Thai Moogambigai Dental College.
[c] Professor, Department of Prosthodontics, Thai Moogambigai Dental College.

TECHNIQUE:

1.Maxillary and mandibular preliminary impressions were made using alginate and the diagnostic casts were poured using orthokal (Kalahbai Karson, India).

2.The diagnostic wax up was done so as to serve as a guide for the tooth preparation and also serve as a provisional restoration.

3.A putty index was made using addition silicone. The putty index was loaded with Protemp along with the acrylic tooth and wax present. This putty index was transferred to the patients mouth to serve as a guide for tooth preparation. (*Fig 2*)

Fig 2: Intraoral matrix for guided tooth preparation

4.The dimensions of the tooth preparation were as follows: the cuspal reduction is approximately 1mm, the occlusal depth is approximately 2 mm, the buccolingual width is about 1/3 to 1/2 of the intercuspal distance, and the depth of the proximal box is 1 mm (1 mm shoulder with rounded internal angles). All preparations were finished by rounding sharp angles.(*Fig 3*)

Fig 3: Modified inlay tooth preparation.

5.The definitive impression was made using a two stage putty light body impression.

6.The provisionalization was done using Protemp (3M ESPE) and the provisional restoration was luted using template (Prime Dental). (*Fig 4*)

7.The master cast obtained was then scanned using an extra oral scanner and 3D planning was done using EXOCAD software. The milling was done with monolithic zirconia blocks.

Fig 4: Provisional Restoration.

8.The final restoration was checked intraorally for the fit and occlusion. Isolation was done using a rubber dam. The teeth were etched using ortho-phosphoric acid for 30 seconds and rinsed thoroughly for 15 seconds. Bonding agent was then applied and cured for 20 seconds. The restoration was conditioned using a silane coupling agent.

9.The restoration was then luted using Multilink dual cure resin cement as per manufacturer's instructions. (*Fig 5*)

Fig 5: Post-operative view after cementation.

10.Marginal integrity, absence of chipping and good gingival health status were observed at a 1-year follow-up (*Fig 6*), The patient was also highly satisfied with the selected rehabilitation.

Fig 6: Post-operative view after 1 year.

DISCUSSION

Partial coverage restorations are preferred over full coverage restorations as they preserve more sound tooth structure. In particular, when abutment teeth contain restorative fillings adjacent to the missing tooth, IRFDPs are considered a very minimally invasive option. Connectors and retainers are the weakest parts of IRFDPs. So as to increase the stability and retention a standardized inlay preparation design was proposed.

Higher in vitro resistance was observed in monolithic high strength ceramic as compared to metal ceramic restorations.[5] A greater mechanical behavior is seen in zirconia based materials used for IRFDPs than lithium disilicate glass-ceramic and fiber-reinforced composites.[6]The increased demand for esthetics and biocompatibility led to the use of zirconia CAD/CAM materials in fixed prosthodontics.

A common failure of the IRFDPs is debonding of the adhesive interface. Rigid connectors, with their low bending behavior, have been suggested as a possible cause of debonding.[7] During clinical function the inter abutment forces might stress the retainer framework and luting interface. To increase the surface roughness and promote micromechanical interlocking, sandblasting of the inner side of zirconia has been suggested. Before incorporating this technique for general practice adequate evidence about long term safety and efficacy of solid zirconia IRFDP are required.

CONCLUSION

Within the limitations of this study, the tooth preparation design is relatively conservative, esthetic and retentive. This case report allows an alternative treatment approach for a single-tooth substitution to an alternative to a full-coverage FDP or an implant-supported crown.

CONFLICT OF INTEREST

There is no conflict of interest

REFERENCES

1. Wolfart S, Bohlsen F, Wegner SM, Kern M. A preliminary prospective evaluation of all-ceramic crown-retained and inlay-retained fixed partial dentures. International Journal of Prosthodontics. 2005 Nov 1;18(6);497-505.
2. Özcan M, Koekoek W, Pekkan G. Load-bearing capacity of indirect inlay-retained fixed dental prostheses made of particulate filler composite alone or reinforced with E-glass fibers impregnated with various monomers. Journal of the mechanical behavior of biomedical materials. 2012 Aug 1;12:160-7.
3. Zhang Y, Lee JJ, Srikanth R, Lawn BR. Edge chipping and flexural resistance of monolithic ceramics. Dental materials. 2013 Dec 1;29(12):1201-8.
4. Augusti D, Augusti G, Borgonovo A, Amato M, Re D. Inlay-retained fixed dental prosthesis: a clinical option using monolithic zirconia. Case reports in dentistry. 2014 May 21;1-7.
5. C. Monaco, P. Cardelli, M. Bolognesi, R. Scotti, and M. Ozcan, “Inlay-retained zirconia fixed dental prosthesis: clinical and laboratory procedures,” European Journal of Esthetic Dentistry 2012 :7(1);48–60.
6. Mohsen CA. Fracture Resistance of Three Ceramic Inlay-Retained Fixed Partial Denture Designs. An In Vitro Comparative Study. Journal of Prosthodontics: Implant, Esthetic and Reconstructive Dentistry. 2010 Oct;19(7):531-5.
7. D. Re, D. Augusti, G. Augusti, and A. Giovannetti, “Early bond strength to low-pressure sandblasted zirconia: evaluation of a self-adhesive cement,” European Journal of Esthetic Dentistry 2012:7(2); 164–175.

Corresponding Author: Dr. Rohit M MDS, Assistant Professor, Department of Prosthodontics, S.R.M. Dental College Ramapuram.
E-mail: rohit.s0422@gmail.com, Ph.No.: +91 9677254785.