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 prosthesis 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.


INTRODUCTION
Consideration of a fixed prosthesis 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%. 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. 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.

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.
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)
4. The dimensions of the tooth preparation were as follows: the cuspal reduction is approximately 1 mm, 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)
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.
8. The final restoration was checked intraorally for the fit and occlusion. Isolation was done using a rubber dam. The teeth were etched using orthophosphoric 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)
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.
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. A greater mechanical behavior is seen in zirconia based materials used for IRFDPs than lithium disilicate glass-ceramic and fiber-reinforced composites. 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. 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