



“ESTHETIC REHABILITATION OF A SEVERELY COMPROMISED ANTERIOR REGION USING A MINIMALLY INVASIVE APPROACH- A CASE REPORT”

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ABSTRACT There is an increased demand for aesthetics among patients today, as well as a desire to lower the expense of therapy while achieving the best possible clinical outcome in the fewest feasible clinical appointments. The primary drawback of traditional fixed partial dentures is the extensive tooth preparation required. Two-unit cantilevered resin-bonded fixed partial denture systems may be explored for the treatment of adolescent permanent anterior teeth that have been lost due to trauma. Zirconia ceramics have increased in precision and marginal integrity as a result of digital technology, boosting the aesthetics of the prosthesis. This has allowed for the replacement of metal-based restorations while still meeting the requirements and expectations of people seeking dental care.

KEYWORDS : Edentulous, labial bone defect, minimally invasive, Esthetics.

INTRODUCTION

Apart from life-threatening conditions, trauma to the orofacial region can result in broken, dislocated, or lost anterior teeth, which can have a substantial detrimental influence on functional, aesthetic, and psychological outcomes.¹ There is an increased demand for aesthetics among patients today, as well as a desire to lower the expense of therapy while achieving the best possible clinical outcome in the fewest feasible clinical appointments. These factors motivate clinicians to seek for novel materials and techniques that enable minimally invasive chair-side treatment and aid in restoring the integrity of missing anterior teeth.²

Numerous treatment methods, including removable partial dentures, porcelain fused metal bridges, Maryland bridges, and implants, might be explored for the treatment of adolescent permanent anterior teeth that have been lost due to trauma. The procedure becomes more challenging when the missing tooth cannot be replaced with an implant-supported prosthesis or a conventional fixed dental prosthesis due to a local bony defect, insufficient bone volume in the edentulous area, occlusal function, systemic disorders, or the patient's socioeconomic status or unwillingness to undergo invasive implant surgery or natural tooth preparation for retainers.³

The primary drawback of traditional fixed partial dentures is the extensive tooth preparation required. Since Rochette⁴ described resin bonded fixed partial dentures (RBFDP) in 1973, they have had a high rate of clinical success. This minimum preparation approach raises significant concerns about its clinical lifespan due to debonding caused by the complicated multidirectional interabutment stresses associated with the three-unit^{5,6,7} design, which puts the retainer and adhesive bond under strain. This increased the popularity of two-unit cantilevered resin-bonded fixed partial dentures (restoration has one or more abutments on one end and the other end is unsupported), which generate fewer complicated 2 forces and hence reduce the stresses that cause debonding. According to numerous assessments, two-unit cantilevered fixed partial dentures outperformed fixed-fixed partial dentures in terms of lifespan, while the majority of unilaterally cracked three-unit resin bonded restorations remained functional as cantilever fixed partial dentures for five or more years.⁸ The primary benefit of RBFDP's is the conservative abutment preparation, which is beneficial in young patients. This clinical case report describes how a cantilevered fixed partial denture was used to replace a lost anterior tooth.

Case Report:

A 28-year-old male patient presented to the Department of Prosthodontics with the primary complaint of losing teeth in the upper and lower front teeth area of the mouth during the previous six months. Patient said that he was involved in a road traffic collision six months before and that he required extraction of the anterior teeth owing to fracture and root canal treatment of the upper anterior teeth due to

fracture with pulpal involvement (Figure 1)



Figure 1) Preoperative image

Clinical examination revealed a partially edentulous gap between 22 and 32, with an increased mesiodistal width between 22 and 23 as a result of 23's distal movement. The labial cortical plate was fractured in the upper and lower anterior regions, resulting in ridge defects (seibert's class 3 defect in 22 and seibert's class 2 defect in 32.) [Figure 2 a, b, and c].

2a)



2b) c)



Figure 2) a) Frontal image; b) Occlusal view of maxillary arch; c) Occlusal view of mandibular arch

Pulp vitality test was carried out which showed that all the maxillary teeth were vital except for 11, 21 which had undergone RCT 6 months back. Clinical and radiographic examination was done using clinical bone mapping (Figure 3) and orthopantomograph (Opg) (Figure 4) which showed that 22 had a labiopalatal width of 4mm at the crest and 9mm at the middle third and the height of residual alveolar ridge from crest of ridge to floor of nasal cavity was 12 mm; 32 had a labiopalatal width of 4mm at the crest and 8mm at the middle third and the height of residual alveolar ridge from crest of ridge to superior border of inferior alveolar nerve was 20 mm.



Figure 3) Clinical bone mapping

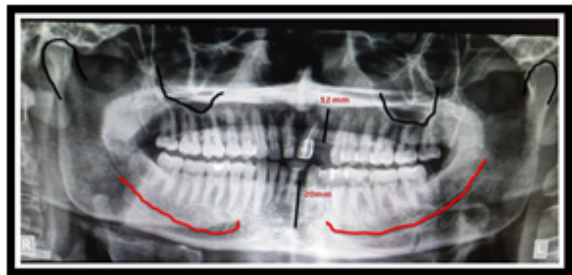


Figure 4) Orthopantomograph(OPG)

As the patient had greater expectations for aesthetics, the treatment option with implants was explained, but he requested an alternative owing to financial constraints. Thus, the treatment plan was to replace the missing 22 and 32 with a minimally invasive technique using a zirconia-based cantilever fixed partial denture irt 22 with primary abutment 11 and 21 to compensate for the increased mesiodistal width between 21 and 23 without impairing the patient's aesthetics, and a resin-bonded fixed partial denture irt 31, 32, 33. with a minimally invasive approach.

Objectives of the treatment:

The objective of the treatment was to restore the partially edentulous space and ridge defect (seibert's class 3 defect) using a minimally invasive technique with a zirconia-based cantilever fixed partial denture irt 22 and a resin-bonded fixed partial denture irt 32 to maximize prosthesis stability, comfort, and function without compromising aesthetics.

Clinical procedure:

The whole treatment was described to the patient, along with its benefits and drawbacks, and informed consent was obtained. Before the treatment began, the patient received oral prophylaxis. The maxillary and mandibular arches were diagnostically impressed using an irreversible hydrocolloid impression medium (figure 4).

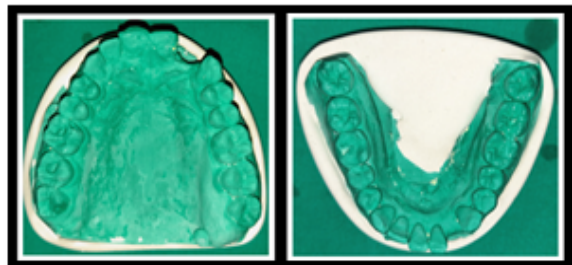


Figure 4) Diagnostic cast

Dental stone was used to pour the master castings. A facebow transfer was carried out. Lateral and protrusive recordings were obtained, followed by articulation using a semi-adjustable articulator (Hanau wide view articulator) (figure 5). The recordings were used to programme the articulator. The wax up was created to help envision the ultimate result (figure 6 a,b,c).



Figure 5) Diagnostic mounting



Figure 6 a)



6 b) c)



Figure 6) a) diagnostic wax-up frontal image; b) right lateral view; c) left lateral view

To compensate for the increased mesiodistal width, the chosen abutment teeth (11, 21) were prepared for zirconia-based cantilever FPD. Preparation of the teeth was followed by isolation and gingival retraction using an impregnated gingival retraction cord. The impression was created in a single step utilising the putty wash method, in which light body impression material was syringed around the tooth borders, followed by impression with putty material loaded in the stock tray. The margins of the imprint were thoroughly checked to ensure there were no gaps or drags. Die stone was used to pour the final imprint.

The mastercasts were scanned using Ceramill Map400 scanner followed by CAD/CAM designing using Exo-cad software on Ceramill by Amann Girschbach (Austria). The Zirconia structure was designed with the greater mesiodistal breadth in mind in comparison to 22. The design included a 1 mm cutback on the zirconia coping to permit low fusing ceramics (Emax) all around the framework while maintaining enough clearance from the opposing opponent. After the framework was created, it was nested into a 16 mm Zirconia Blank (Amann Girschbach), values were determined, and the structure was then sent to a Ceramill Motion 2 milling machine for processing. (7a,b,c,d)



Figure 7a) b)



c) d)

Figure 7) a) CAD-CAM designing- Frontal view; b) occlusal view; c) checking for the clearance with the antagonist; d) Full-contoured cantilevered FPD

After milling, it was placed in a sintering furnace set to the normal temperature cycle for zirconia. Later, the structure was reinforced with Emax Ceramic to compensate for the increased mesiodistal width. The finished prosthesis was cemented with resin cement (RelyX U200) (figure 8).

To prepare the mandibular edentulous area irt 32 for a Maryland resin bonded fixed partial denture, a conservative tooth preparation was performed irt 31 and 33, followed by correct isolation and secondary impression utilising the one step putty wash procedure. Maryland resin bonded fixed partial denture was sealed using resin cement after adequate isolation (RelyX U200). (Fig. 9 a, b, c, d)

Post-insertion instructions were provided to the patient, and reminder visits were emphasised. The patient was quite pleased and delighted with the final result.

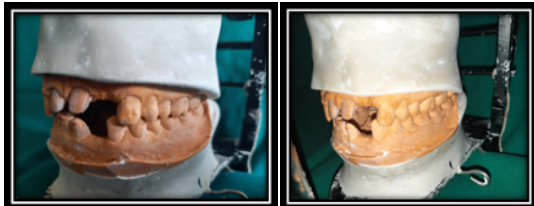
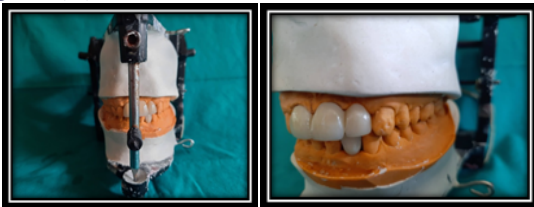
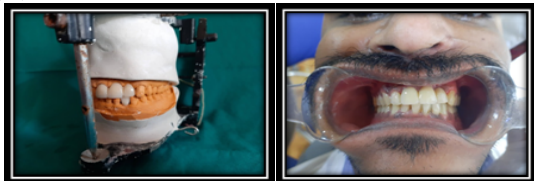


Figure 9 a) b)



9c) d)



9e) f)



9g)

Figure 9) a) b) Mounting of master cast; c) d) e) fabrication of zirconia based cantilevered FPD irt 11,21,22 and Maryland resin bonded FPD irt 31,32,33; f) cementation of cantilevered FPD and resin bonded FPD g) post-operative image.

DISCUSSION:

Esthetics is defined by harmony, beauty, distinctiveness, and naturalness. The maxillary anterior teeth dominate dental and facial aesthetics. Thus, the major priority when any anterior teeth are lost due to trauma or for any other cause should be to restore the face to its natural look. Numerous therapy approaches should be considered when an adolescent's lost anterior teeth are replaced. Implants are regarded to be a promising therapeutic option for missing anterior tooth restoration. The disadvantage of implants is that they place financial limits on patients, since implants are a costly therapeutic option. Prior to pursuing an intrusive conventional treatment option such as a conventional fixed partial denture or implant therapy to replace lost anterior teeth, a flexible least invasive alternative and definite long-term treatment for missing anterior teeth should be devised.

RBFPD is also deemed effective in specific clinical settings when the edentulous span is small, the abutment is vital and undamaged, and the abutment teeth have few dynamic occlusal interactions. However, the patient's aesthetic concerns regarding the appearance of metal retainers used in RBFBD may limit this technique to tooth replacement.⁹ Though the Maryland bridge is a minimally invasive technique, it was used in this instance because the patient's mesiodistal breadth was greater than his upper anteriors. Replacing the same with a resin bonded fixed partial denture is the only way to attain the best cosmetic result. To address the aesthetic concerns as well as the increased mesiodistal width in relation to the upper anteriors, as well as the root canal treated teeth irt 11,21, the best treatment option was to replace the edentulous site with a cantilevered fixed partial denture irt 22, which was supported by 11 and 21 with all ceramic restorations.

A rehabilitation strategy involving anterior teeth involves meticulous planning and study of all aesthetic aspects. Understanding the concepts of natural smile aesthetics and how to apply them to oral rehabilitation is critical for effective treatment.¹⁰ The primary objective of prosthetic rehabilitation should be to contrast the shape, colour, and texture of the teeth with the gums and lips to produce an appealing composition. Maintaining healthy interdental papilla and gingival tissue as a frame for the teeth is a critical cosmetic consideration throughout diagnosis and treatment. Gingival shape and colour changes, such as marginal height or the existence of dark voids between the incisors, may jeopardise the aesthetics and harmony of smiling.¹¹ Additionally, the absence of a papilla might result in phonetic difficulties and food impaction.

Additionally, to obtain the best cosmetic outcome, a treatment regimen must be followed, which may include pictures, radiography, diagnostic waxing, and studying models. As a result, an accurate diagnosis of the situation must be made. Additionally, suitable clinical processes like as adequate tooth preparation and cosmetic adjustment of interim restorations serve as prototypes for the final ceramic prosthesis and provide useful information for the technical specialist.

The current aesthetic trend necessitates materials with clinical performance that is closer to that of a natural tooth. Thus, metal-free ceramic prostheses have become a biomechanically and aesthetically feasible alternative to metal ceramic permanent prostheses.¹²

Zirconia-based all-ceramic restorations provide a greater clinical performance compared to metal-based restorations owing to its highly aesthetic character, improved mechanical capabilities, and compatibility with oral tissues. Zirconia's aesthetic properties, high mechanical strength, toughness, corrosion resistance, tolerance to changing temperatures, and great compatibility make it the material of choice for crown fabrication in permanent partial prosthesis.

CONCLUSION:

By restoring the lost anteriors with an enlarged mesiodistal width utilising a zirconia-based cantilevered fixed partial denture, we were able to decrease inter-abutment stress, preserve the tooth structure, and improve the patient's aesthetic appeal.

Additionally, zirconia ceramics provide higher aesthetics, biocompatibility, and improved mechanical qualities. Zirconia ceramic systems have increased in precision and marginal integrity as a result of digital technology, boosting the aesthetics of the prosthesis. This has allowed

for the replacement of metal-based restorations while still meeting the requirements and expectations of people seeking dental care.

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