Esthetic Consideration in Medically Compromised Patients Using Fiber Reinforced Composite Splint : Two Clinical Reports

Dr. Amit Jena
Reader

Dr. Shashirekha .G
Reader

Dept. of Conservative Dentistry & Endodontics, Institute of Dental Sciences, Siksha 'O' Anusandhan University, Bhubaneswar, Orissa.

Abstract

Back Ground

An immediate one session prosthetic rehabilitation for a patient with periodontal and medically compromised condition is presented. The present two case reports discuss the management of anterior edentulous space with Fiber Reinforced Composite (FRC) splint and composite pontic in single session & the importance of prompt esthetic management is reviewed.

Key Words: Fiber-reinforced composite (FRC) splint, Composite pontic, Medically compromised patient, partial immediate prosthesis.

Intoduction

It's a challenge to a dental clinician to treat a patient with multiple medical problems like Renal transplant, Spleenectomy, Hypertension, Diabetes Mellitus for a better future. The amount of edentulous space, position and size of teeth and patient's expectations should be considered when choosing the appropriate material and technique. Hence application of minimal invasive technique to provide the restoration through minimum or no preparation on neighboring sound teeth is the most preferable choice.

With tremendous improvements in material chemistry, the new generation of composite resin includes a new and improved highdensity radiopaque (HDR) fillers. The new HDR filler directly enhances the surface hardness (low wear), upgrades handling properties (non-sticky/non-slumping), provides excellent polish and amplifies the radiopacity of the material. (eg, Aelite™, BISCO; Filtek™ Supreme Plus, CeramX™ etc) [1]. FRC [2,3] has also been used for various direct intra-oral fabrications like posterior bridges, pontic buttons, splinting the tooth, bonding the natural tooth pontic [4]. The bond strength between the prosthesis and the abutment teeth obtained when using FRC materials is 50-100% higher than the bond strength achieved using metal frame work [5]. FRC restorations are translucent and covered with composite pontic resulting in good esthetic restoration[6] , less plaque accumulation, and avoid the possible increase in Streptococcus. mutans adhesion[7].

These case reports describe the management of edentulous space with these advanced materials as immediate one-session partial prosthesis.

Case Reports

Case -1

A 52-year-old woman was referred to The Department of Conservative Dentistry & Endodontics, with a partial edentulous area of mandibular anterior region. Medical history revealed that Spleenectomy was done 5years back; Renal Transplant was done 10years back. She is known Diabetic and Hypertensive for past 10years and is under medications as prescribed by her physician.

Intraoral examination revealed a generalized attrition of dentition, asymptomatic root stump in relation to mandibular right central incisor with diastema (Figure 1). Occlusion and periodontal status was statisfactory. Radiograph examination showed no periapical radiolucency but the root canal of mandibular right central incisor was calcified.

Clinical Procedure

The canine and lateral incisors of both mandibular quadrants were cleaned using prophylaxis paste. As a conservative approach, a FRC glass braided fiber (Interlig, Angelus) and Ceram X mono composite was used to build the missing tooth structure. Approximate length for FRC fibers was selected by measuring the distance between tooth 33 and tooth 43 and were dampened with bonding agent (Prime & Bond NT, Denstply) on a glass slab. Adjacent teeth were protected (plastic matrices) to avoid inhomogeneous etching patterns. 37% phosphoric acid gel (EZ Etch Denstply) was applied to the lingual surfaces for 20 seconds. Etchant was thoroughly rinsed and teeth air dried before application of bonding agent to the etched teeth with the help of microbrush. FRC fibers were placed on to the teeth and light cured with LED polymerization lamp (Translux Power Blue, Heraeus Kulzer). Shade selection done and the missing teeth built by using composite (Ceram X mono, Densply) directly on to the FRC splint on the labial aspect by incremental method. After obtaining proper anatomy of the

missing tooth, occlusal adjustment was done with carbide burs and final polishing was done on both facial and lingual surfaces with polishing discs (Soflex disc 3M ESPE) (Figure 2).

Patient was recalled after 1 week to check the maintaince of oral hygiene and status of composite pontic prosthesis. At 3 months recall, periodontal status was good and prothesis was intact without any displacement. At 1year recall, there was incisal fracture of composite pontic in right central incisor which was corrected with composite as in (Figure 3)

Case -2

A 45-year-old woman was referred to the Department with a partial edentulous area of maxillary anterior region. Medical history revealed that Renal Transplant was done 5years back. She is known Diabetic and Hypertensive for past 5years. She was under medications as prescribed by her physician. Patient had a history of road accident 2years back, where she lost all her madibular teeth. Dental history revealed that patient used to wear mandibular complete denture and later discontinued due to instability of denture. On clinical examination, the periodontal status of remaining teeth was satisfactory as in (Figure 4). The fabrication of a traditional fixed partial denture was avoided since the patient needed an immediate replacement of teeth for esthetic and social reasons.

Clinical Procedure

The canine and premolars of both maxillary quadrants were cleaned using prophylaxis paste. Restorative technique similar to case report was followed to replace the missing teeth structure. After obtaining proper anatomy of the teeth, final finishing was done with carbide finishing burs and polishing was done on both facial and lingual surfaces with polishing discs (Soflex disc 3M ESPE) as shown in Fig. 5.

Patient was recalled after 1 week to check the maintainace of oral hygiene and status of composite pontic prosthesis. At 6 months recall, the immediate partial denture with FRC splint and composite pontics was intact without any displacement (Figure 6).

Discussion

Treatment plan for a medically compromised patient's partially edentulous anterior region with satisfactory periodontal stastus is difficult. The use of non metallic, fiber-reinforced resin based composite for human tooth replacement is detailed for anterior and posterior indirect procedures. The use of fiber reinforcing composite increases the flexural strength of present day material. Today FRC is most commonly used in prefabricated form for endodontic post. Unfortunately, these systems have few advantages over Porcelain Fused to Metal (PFM) and All Ceramic crowns like replacement of missing tooth directly in the mouth in less than 2hours and cost is about half the cost of PFM bridge. The limitation of FRC is the ability of the prosthesis to resisit torsional forces[8]. FRC are fabricated based on fiber type and fiber architecture as chairside product (Table 1). FRC applications are considered as alternative treatment in adhesive techniques [9,10]. The use of FRCs as a direct technique for a bridge construction requires a high level of skill in the composite build-up and current knowledge of the aesthetic aspects of teeth. Maintance of Oral hygiene in a medically compromised patient is important to avoid secondary infections. Studies has reported the adherence of Candida albicans to E-glass fibers was lower than to polymer matrix in the denture composite. Streptococcus mutans adhesion can be reduced by covering fibers with the matrix polymer of the composite. [7,11]

A review of literature reports that repair of a fiber-reinforced fixed partial denture(FPD) with a hybrid composite in combination with aluminum oxide air-abrading pretreatment and silanization provided sufficient fracture strength. Therefore the replacement of the complete restoration may be avoided [12]. The challenge in creating an esthetic result with FRC splints is that there is limited space in the connector region to create the three-dimensional effect required to give teeth the appearance of individuality. Careful planning in the diagnosis and treatment of the fiber splint is essential to allow for adequate tooth preparation to give the illusion of nonsplinted teeth. Based on the current clinical results, it is reasonable to expect FRC FPD to reach longevity of 5-10 years [13-15]. Finally, it must be emphasized that the fiber reinforcement technology offers new prospects and approaches to the profession.

Conclusion

A one-session technique for managing the space with resin pontic and FRC splint in a medically compromised patient has many advantages of good esthetics, fair strength, less time consumption, low cost and completion of the procedure without the need of a dental laboratory. Clinical observations, evidence-based designs, and proven restorative methods have been combined to use this methodology to restore missing teeth in selected situations.

Table-1

Pre-impregnated Chairside Products			
PRODUCT	**COMPANY**	**FIBER TYPE**	**FIBER ARCHITECTURE**
Splint-It	Jeneric/ Pentron	Glass	Unidirectional
Splint-It	Jeneric/ Pentron	Glass	Weave
Splint-It	Jeneric/ Pentron	Polyethylene	Weave
Impregnation Required, Chairside Products			
PRODUCT	**COMPANY**	**FIBRE TYPE**	**FIBER ARCHITECTURE**
Connect	Kerr	Polyethylene	Braid
DNA Fibres	Dental Ventures	Polyethylene	Unidirectional
Fibre Splint	Inter Dental Distributors	Glass	Weave
Fibreflex	Biocomp	Keviar	Unidirectional
GlasSpan	GlasSpan	Glass	Braid
Ribbond	Ribbond	Polyethylene	Leno Weave
INTERLIG	Angelus ANGELUS	GLASS	BRAID

References

1. Wynn H. Okuda, DMD. New High Tech Composite Resins Simplify Aesthetics", Practical Procedures and Aesthetic Dentistry, April 2004.
2. Goldberg CJ, Burstone CJ. Fiber reinforced composites in dentistry [abstract 638]. J Dent Res. 1991;70:345.
3. Goldberg AJ, Burstone CJ. The use of continuous fiber reinforcement in dentistry. Dent Mater. 1992;3:197-202.
4. Turner WE. Direct fiber reinforced composite bridges, part 2. J Cosmetic Dent. 2001;17 (1): 56-66.
5. Kallio TT, Lastumäki TM, Vallittu PK. Bonding of restorative and veneering composite resin to some polymeric composite. Dental Mater 2001; 17: 80-6.
6. Freilich, M.A., et al., Development and clinical applications of a light-polymerized fiber-reinforced composite. J Prosthet Dent, 1998. 80(3): p. 311-8.
7. Tanner, J., P.K. Vallittu, and E. Soderling, Effect of water storage of E-glass fiber-reinforced composite on adhesion of Streptococcus mutans. Biomaterials, 2001. 22(12): p. 1613-8.
8. Vallittu, P.K., I.E. Ruyter, and K. Ekstrand, Effect

of water storage on the flexural properties of E-glass and silica fiber acrylic resin composite. Int J Prosthodont, 1998. 11(4): p. 340-50.
9. Brunton PA. Fiber-reinforced composite fixed partial dentures: initial experiences. In: Vallittu PK (ed). The third international symposium on fiber-reinforced plastics in dentistry Manchester, England, 2002:7-14.
10. Vallittu PK. Prosthodontic treatment with a glass fiber-reinforced resin-bonded fixed partial denture: a clinical report. J Prosthet Dent 1999;82:132-135.
11. Waltimo, T., et al., Adherence of Candida albicans to the surface of polymethylmethacrylate-- E glass fiber composite used in dentures. Int J Prosthodont, 1999. 12(1): p. 83-6.
12. Rosentritt, M., et al., Intraoral repair of fiber-reinforced composite fixed partial dentures. J Prosthet Dent, 1998. 79(4): p. 393-8.
13. Kangasniemi. I, Vallittu. PK, Meiers. J, Dyer, SR, Rosentritt, M. Consensus statement on fiber reinforced polymers: Current status, future directions, and how they can be used to enhance dental care. Int. J. Prosthodont., 2003; 16:209.
14. Vallittu, PK. Survival rates of resin-bonded, glass fiber-reinforced composite fixed partial dentures with a mean follow-up of 42 months: A pilot study. J. Prosthet. Dent., 2004; 91:241-47.
15. Monaco, C, Ferrari, M, Miceli, GP, Scotti, R. Clinical evaluation of fiber-reinforced composite inlay FPDs. Int. J. Prosthodont., 2003; 16:319-25.
16. Blitz, N., Adaptation of a fiber-reinforced restorative system to the rehabilitation of endodontically treated teeth. Pract Periodontics Aesthet Dent, 1998. 10(2): p. 191-3.
17. Belvedere, P.C., Single-sitting, fiber-reinforced fixed bridges for the missing lateral or central incisors in adolescent patients. Dent Clin North Am, 1998. 42(4): p. 665-82,
18. Paul van Wijlen, DDS. A Modified Technique for Direct, Fibre-Reinforced, Resin-Bonded Bridges: Clinical Case Reports. J Can Dent Assoc 2000; 66:367-71.

Case 1

Figure 1: Pre-operative Photograph.
Figure 2: Post Operative Photograph (labial View)
Figure 3: Photograph After 1year.

Case 2

Figure 4: Per-operative Photograph
Figure 5: Post Operative Photograph (labial View)
Figure 6: Photograph After 6 Months.


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6