FIBER POST, COMPOSITE CORE, ALL-CERAMIC CROWN AND RESIN CEMENT – AN AESTHETIC COCKTAIL

Shailesh Jain∗,1 and Pulkit Jain∗∗,1

∗Assistant professor, Department of Prosthodontics, School of dental sciences, Sharda University.; ∗∗Postgraduate student, Department of Prosthodontics, Subhari dental college, SVSU.

ABSTRACT Aesthetic replacement of natural teeth is a global demand which has brought the evolution of restorative materials in the last couple of decades. The sensitiveness of the patient towards aesthetics has seen a growth in marketing of fibre posts, all-ceramic crowns and resin cements. We present a case of a young adult female patient with a grossly destroyed maxillary left central incisor that was restored using a fibre post followed by a core build-up of composite resin on which an all-ceramic crown was cemented using resin cement. The combination of aesthetic, friendly all restorative materials produced life like restoration, which satisfied the needs of the patient.

KEYWORDS composite, fibre post, prefabricated post, all-ceramic crown, zirconia

Introduction

Fracture of an anterior tooth or teeth can result from trauma which in most of the cases is a fall, especially in young ages. The fracture is usually complicated in term of a pattern (vertical or horizontal), extent (with or without pulpal injury), impact force (may fracture one tooth, but pulp death to other adjacent teeth) and inclination within the alveolar bone (proclined, straight, rotated or reclined). Restoring such situations requires clinical assessment of determining the need of a post and core (prefabricated versus cast post core) [1] and the type of crown (metal free versus metal-backed).[2] A post and core method of retaining a crown is versatile since it can be used in any situations, even in case of full mouth rehabilitations when most of the natural coronal tooth structure does not exist.[3] The use of cast post core can even be indicated to correct a malpositioned tooth/teeth and restore a more aesthetic appearance of the natural crown.[4]

The recent development of fibre posts has brought an alternative clinical option for cast post core since they can be modified clinically into the desired core forms.5 With resin cement luting they provide almost similar strength of the existing crown as cast post cores do. The ability of the fibre posts to be cemented to an all-ceramic crown is another significant advantage that has reduced the use of metal-ceramic crowns as restorative means. This article reports such a unique case of fibre post retention of an all-ceramic crown.

Figure 1: Extraoral view showing grossly destroyed maxillary left central incisor and a high lip line.
Case report

A young female patient aged 32 years was referred to the department of prosthodontics after getting a maxillary left central incisor endodontically treated in the department of restorative dentistry. The patient was a school teacher by profession and was highly concerned about her disfigured smile due to loss of the coronal portion of a front tooth. Patients medical, social and drug history were non-contributory to the existing treatment plan. Extraoral examination revealed normal clinical features except having a gummy smile (high lip line) (Fig 1). Intraoral examination presented a picture of class I molar relation with anterior teeth in an edge to edge relation. Maxillary left central incisor was grossly destroyed with half of the lower third of the coronal portion still intact. The discrepancy in the size of the maxillary and mandibular anterior teeth had resulted in the spacing of the anterior teeth. The occlusal examination demonstrated a mutually protected occlusion that was progressing to a group function occlusion due to inadequate anterior guidance. Treatment options offered to the patient included restoration of the tooth with a post-core crown. The options for the post were a prefabricated fibre post followed by a composite dual-core buildup, upon which either porcelain fused to metal or an all-ceramic crown would be placed.

The patient consented to the all-ceramic crown since she was not ready to risk the impact of metal backing on porcelain translucency in porcelain fused to metal restoration. Mouth preparation that was advised included an oral hygiene maintenance program followed by evaluation of endodontic treatment, after which the prosthetic procedures were recommended. Prosthetic treatment was initiated by the post space preparation within the root of maxillary left central incisor after removal of the endodontic filling (Fig 2). A ferrule was prepared all around the remaining tooth structure before a fibre post (ParaPost Fiber Lux No. 5/Taper Lux, Colte’ne/Whaledent, Inc, Cuyahoga Falls, OH, USA) was selected according to the available space within the prepared root. Once the fit of the fibre post was verified on a radiograph, the post was cemented using a self-adhesive resin cement (SoloCem Dentin, Colte’ne/Whaledent Inc). On the cemented post, a core was built up with a composite resin (Clearfil Photo Core, Kuraray Dental, Japan). The core was then prepared with a diamond bur using a high-speed handpiece following the basic principles of tooth preparation for an all ceramic crown (Fig 3). A shoulder margin was prepared all around the natural tooth structure with an equigingival finish line.

A definitive impression using an addition silicone elastomer (Reprosil, Dentsply/Caulk; Milford, DE, USA) using a putty reline technique. The impressions were sent to the ceramic laboratory for the fabrication of an all-ceramic crown (IPS e-max System, Ivoclar-Vivadent) along with the recommended shades on a shade chart. The all-ceramic crown was cemented after conditioning the inner surface with hydrofluoric acid (IPS Etching Gel, Ivoclar-Vivadent) for 20 seconds and cleaned with 37% phosphoric acid gel (Total Etch, Ivoclar-Vivadent) for 30 seconds. A light cure resin cement (Variolink Veneer, Ivoclar-Vivadent) was used for final cementation of the crown (Fig 4). The occlusion was evaluated for centric and protrusive contacts in both centric and eccentric positions. The patient was put on a follow-up protocol for six months (1 week, one month and six months). The patient was highly satisfied with the esthetic outcome of the all aesthetic combinations of a fibre post, composite core and an all-ceramic crown.
Discussion

Fracture of a crown of a natural tooth is more prone in patients whose anterior teeth are proclined as in this case. Depending upon the fracture line, the prognosis can be determined. Since the tooth structure loss was limited within the coronal part of the tooth, the prognosis of the tooth, in this case, was good. The use of fibre resin post, in this case, has been the first choice for fibre resin post-show similar hardness values to dentin besides being more durable to metal posts.[6] the fibre post also strengthens the remaining tooth structure thereby providing the weak tooth structure more resistance against fracture. This feature is similar to that of cast post-core.[7] when the inclination of the remaining root is not complicated due to rotation or proclination, the fibre post allows the clinician to build up a core inclination within the desired form of the remaining coronal tooth structure.[8] one of the key disadvantage of previous carbon fibre posts was the dark color of the material that influenced the aesthetics of the overlying ceramic restoration. Newer fibre posts are translucent that may include either glass, quartz or silicon fibre within the matrix.[9]

The underlying restorative material influences the esthetics of an all-ceramic crown and even the cement that is used to retain the crown.[10] for all-ceramic crowns there are presently many choices which range from zirconia to alumina reinforced coping or different procedural crowns like castable or pressable ceramics. The crown we chose is called the E-Max crown which is a type of all-ceramic crown that is made from a single block of lithium disilicate ceramic.[11] the strength of the crown in all-ceramic systems depends largely upon the thickness of the restorative material and the preparation design. As per the manufacturer, the tooth preparation for the E max crown is 0.5 mm less than conventional tooth preparation of 2 mm on occlusal surfaces which makes the use of E max crown more conservative than remaining all-ceramic systems. However, the E max system does not allow the use of a chamfer finish line near gingival contour and it is recommended to have a flat shoulder margin, which should be at least 1 mm deep.[12,13] The E max crown is however more translucent than other ceramic systems which allow absorption of more light thus allowing the tooth to appear white. It should not be used if the hue of adjacent teeth is yellow.

Conclusion

The choice of restoring a fractured tooth is subjective in nature. However, the properties of underlying foundation restorations like the post and core should be taken into consideration. Fibre posts can be built up to a core in a single appointment thus eliminating the dependence of laboratory technical work quality.

Acknowledgements

We acknowledge the guidance from our peers in the department who refined the polished outcome of this case.

Conflict of Interest

No conflict of interests.

References

1. Mattoo K, Shalabh K. Multiple post core crowns – A case report. Clinical dentistry 2011;7:31-34
2. Geeta PS. Management of complex crown root fracture using fiber post- A case report. Endodontology 2014; 26(1).
3. Lakshya L, Kumar A, Mattoo KA. Full mouth rehabilitation involving multiple cast post core as foundation restorations – case report. Int J Med Res Pharmac Sci 2018;5(7):11-15
4. Yadav L, Mattoo KA, Kapoor A, Shuja S. Factors associated with post core correction of malpositioned teeth. International Journal Of Research In Medical Sciences And Technology 2015;1(2):3-5
5. Garoushi S, Vallittu PK, Lassila LV. Continuous and short fiber reinforced composite in root post-core system of severely damaged incisors. Open Dent J 2009; 3:36-41.
6. Kumar SC, Rao A, Sheila K, Reddy HG. Multidisciplinary approach in management of fractured central incisor through composite plug stabilization - A Case Report. J Int Oral Health 2013; 5:79-82.
7. Hayashi M, Sugeta A, Takahashi Y, Imazato S, Ebisu S. Static and fatigue fracture resistances of pulpless teeth restored with postcores. Dent Mater 2008; 24:1178-86.
8. Munee RA, Mattoo KA, Yousef AM. A novel approach to determine the aesthetic inclination of cast post core – case report. Annals of International Medical and Dental Research 2017; 3(6): DE14-DE17
9. Richard S, Schwartz, DDS, and James W. R Post Placement and Restoration of Endodontically Treated Teeth: A Literature Review journal of Endodontics. 2004.30(5).
10. Mattoo KA, Kapoor A, Sivach A. Selecting the right cement for cast post core crowns – a dental students quandary. Journal of Medical Sciences and Clinical Research 2014; 2(9): 2323-27
11. Chen YM, Smales RJ, Yip KH, Sung WJ. Translucency and biaxial flexural strength of four ceramic core materials. Dent Mater. 2008; 24:1506–1511.
12. Kelly JR, Benetti P. Ceramic materials in dentistry: historical evolution and current practice. Aust Dent J. 2011; 56:84–96.
13. Al Moaleem MM, Alkhayrat FM, Makkawi HA, Geathy IH, Qahhar MA, Yaqoub A, Mattoo KA. Subjective differences between dentists and patients about relative quality of metal ceramic restorations placed in the esthetic zone. J Contemp Dent Pract 2017; 18(2):112-116.