AN INNOVATIVE TECHNIQUE TO SALVAGE FRACTURED ABUTMENT TEETH AND REFURBISH AN EXISTING FIXED PROSTHESIS

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Introduction:

Fracture of the abutment tooth is a commonmechanical cause of failure in fixed partial dentures (FPD).[1]According to Barreto, fracture of the abutment tooth is a biological consideration of failure of FPD(s).[2]Semi-precision attachments are an effective means to improve the retention, reduce coverage and increase patient acceptance of a cast partial denture.[3]Failure of abutment teeth supporting the fixed segment of an attachment retained prosthesis may have catastrophic consequences for both the dentist and the patient. Failure most commonly occurs by horizontal fracture of the tooth at the cemento-enamel junction.[1] This mode of failure is grouped under Class IV of the Grading of failures based on severity by JJ Manappallil.[4]Not all patients can afford the cost of refabricating, in these cases 'refurbishing' the existing FPD may be a cost effective alternative.This paper describes a unique technique to salvage fractured endodontically treated abutment teeth using cast post and core and reusing the existing fixed dental prosthesis.

Case Report:

The patient 57 year old, female was referred to the Department of Prosthodontics and Crown & Bridge, MCODS, Mangalore with the complain of a loose fixed prosthesis in relation with 11, 12 and 13. Clinical examination and history taking revealed splinted crowns in relation with root canal treated 11, 12 and 13. 11 was restored with a cast post while 12 and 13 were not prepared to receive posts.Extra-coronal semi-precision attachments (Rhein 83 OT CAP attachments system) were cast at the distal end of the splinted prosthesis.

Figure 1: intra-oral occlusal view of fractured abutment tooth (13)

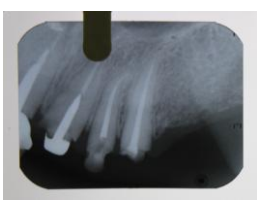

Figure 2: intra-oral periapical (IOPA) radiograph showing cast post and core i.r.t. 11 and root canal treated 12 and 13 with cast posts. Also fractured of crown structure of 13 is evident.

A similar prosthesis i.r.t 21, 22 and 23 was used to provide bilateral retention for a cast partial denture for missing 24, 25, 26 and 14, 15, 16 and 17. The mobile splinted prosthesis was easily dislodged and revealed a fracture of the crown of the 13 with minimal residual tooth structure. In this situation the cast partial denture would be rendered non-retentive in the absence of one of the retentive males attached to the dislodged fixed segment.

The fractured coronal tooth fragments of the 13 in the retainer were removed with the help of an ultrasonic scaler. Residual cement was removed from the surface of the tooth and using a finishing bur in an airotor and any sharp margins of the remaining tooth structure were rounded off. Care was taken to ensure that no alterations were made in the existing finish line.

Steps in fabricating the new cast post:

1. Preparation of post space: Using gates glidden drills 2, 3 and 4 the guttapercha was removed from the canal leaving behind 5-6mm of peri-apical guttapercha. Then using peso-reamers 2, 3 the canal walls were cleared of remnantguttapercha and shaped to have smooth walls, free of any grooves or ridges. **(Figure. 3)**Grooves and ridges are avoided as they may provide obstruction to the complete seating of the post and overlying fixed prosthesis.[5]

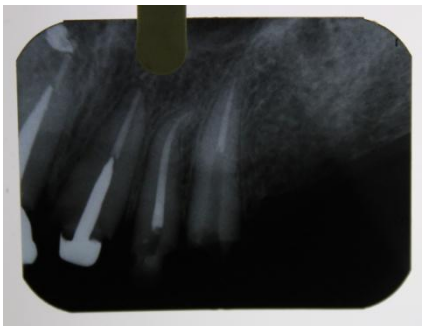

Figure 3: IOPA shows post space preparation for 13.

2. Making the post space impression: A match stick was shaped such that it would reach the complete depth of the preparation while fitting passively in the canal. Additionally, for this technique the height of the wooden stick was adjusted such that it would be long enough to support thecore without obstructing complete seating of the prosthesis.
3. The inner surface of the crown for the 13 and the prepared canal were lubricated with a thin layer of petroleum jelly.**(Figure.4)**

Figure 4: Fitting surface of splinted crowns i.r.t 11, 12 and 13 lubricated with a thin layer of petroleum jelly petroleum jelly

4. Pattern Resin™ LS (GC Tokyo, Japan) was mixed and carried into the canal with an endodontic K file of appropriate size. The wooden matchstick was also coated with pattern resin and seated in the canal to obtain the form of the post space.
5. Simultaneously, pattern resin was loaded in the fitting surface of the retainer for the canine and the fixed segment was seated intraorally.
6. The excess resin at the margins was removed and without wasting much time the cast partial denture was seated and maintained in place under occlusal bite pressure.
7. Once setting of the pattern resin was confirmed extra-orally, the cast partial denture along with the fixed prosthesis were removed.
8. The pattern resin impression came along with the crowns and was easily separated from its mould.**(Figure. 5 & 6)**

Figure 6: Lateral view of pattern resin impression (extra-oral)

Figure 5: Intra-oral occlusal view of pattern resin impression for custom cast post and core for 13.

9. The 0pattern resin impression of the post and core space wassprued and cast in Ni-Cr alloy (Wirolloy NB Bego, Germany). Pattern resin undergoes minimal dimensional changes and burns out completely without any residues. The cast post obtained by following this technique will require minimal adjustments. The sprue is cut, seating interferences are removed and the cast post and core is finished polished and prepared for cementation.**(Figure. 7)**

Glass Ionomer Cement (GC Fuji I®, Tokyo Japan) was the choice of luting agent used for cementation of the cast post and core as well as the crowns. First the post and core is luted in the canal. Next the splinted crowns are luted in place, the excess material at the margins of the restoration was removed and the cast partial denture was immediately seated in place and maintained under occlusal force.**(Figure. 8)** Once the cement is set, any residual cement at the margins is removed and the patient is recalled every 3 months for evaluation.

Figure 7: Intra-oral occlusal view of custom cast post cemented in position

Figure 8: Intra-oral occlusal view after the fixed and removable segments are cemented and seated in position respectively.

Discussion-

This paper proposes a simple and cost effective solution to abutment tooth fracture, ensuring restoration of function in two clinical appointments.Considering the extensive loss of tooth structure and the need to design a core that would conform perfectly to the fitting surface of the retainer, it was decided to fabricate a direct custom cast post using pattern resin. Rayyan et al have found no statistically significant difference in the accuracy of cast posts fabricated with direct and indirect technique.[6]Priest and Goerigdescribed this technique to repair fractured abutment teeth in FPDs using Duralay resin.[5]We have adapted this technique to suit the present case scenario.The recording of post space and core impressions simultaneously in pattern resin ensured proper binding of the two segments of the impression. This impression could then be casted immediately and fitted with minimal adjustments thus reducing chair-side time.

Conclusion-

The onus of maintenance of a delivered prosthesis is on the operating prosthodontist. The above mentioned technique can be employed as a quick and efficient method to salvage favourably fractured abutment teeth in biomechanically critical positions of any fixed or combined prosthesis. Besides repair one must always look into and treat the underlying cause of failure to prevent recurrence.

References-

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