A Novel Approach as Post Endodontic Restoration With Metal Endocrown

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Abstract:

Introduction: All the teeth undergoing pulp space therapies require a good form of post-endodontic restoration to rehabilitate the teeth back to functionality. Root canal treatment is a procedure which removes the part of tooth structure during access and canal shaping, removes vital contents of the pulp space, which in due course leads to increased fragility of the remaining tooth structure due to dehydration and loss of elasticity of dentin. There is increased prevalence rates of tooth fractures in endodontically treated teeth due to diminishedfunctional architecture. Full coverage restorations further weakens the tooth. Preservation of maximum tooth structure with conservative tooth preparation contemplates as the standard measure for restoring teeth. **Case Description:** Recently, endocrowns have been introduced as conservative modality of treatment as post-endodontic restoration. This case report delineates the treatment aspect of endodontically treated left mandibular 2nd molar with metal endocrown. **Clinical significance:** Treatment of severely mutilated teeth with conservative mode of treatment plays a great role of clinician's assertiveness and capacity to rebuild the lost tooth structure with minimal approach. Minimal invasive dentistry is the new norm and preservation of remaining tooth structure is the key to success.

Keywords: Post endodontic restoration, mutilated teeth, conservative preparation

Introduction

Post-endodontic restoration is essential not only to preserve and protect the remaining tooth structure but also to restore esthetics, form, and function in endodontically treated teeth. Restoring the lost strength of endodontically treated teeth can be achieved by mini-invasive tooth preparations with maximal tissue preservation. Thus clinician can mechanically stabilize the tooth-restoration complex and help in increasing the longevity of the endodontically treated tooth. [1]

Coronal rehabilitation of a severely damaged teeth always poses a threat to the practitionerdue to its longevity depending on multiple factors such as occlusion, function, esthetics etc. Hence they are best restored with indirect restorations with intra-radicular stabilization. Bindl and Mormann proposed "Endocrown", a

conservative remedialalternative for restoring nonvital teeth taking pulp chamber support to form a definitive onlay restoration made of ceramic.[2]

Endodontically treated teeth vary from vital teeth both in terms of structural and physical integrity. Majority of the changes that occur in endodontically treated teeth include, loss of tooth structure either due to caries or trauma and then biomechanical alterations in the tooth structure like loss of elasticity, increased brittleness etc. making them more prone to fracture. [3,4]Endocrowns made up of ceramic/zirconia are considered as better alternatives to full coverage restorations for non-vital posterior teeth. They are especially indicated in teeth with nominal coronal architectureand adequate tooth supportobtainable for sturdy adhesive cementation. [5] Ceramic /zirconia crowns are quite expensive and especially ceramic needs proper thickness for its strength.

This case report is a two year follow up of a case with novel approach where endocrown made off base metal alloy has been used as a semi-conservative treatment modality to post & core that provided with less cost & less clinical time with minimum tooth preparation for an endodontically treated tooth. The present case report follows the 2013 CARE guidelines for reporting case reports.[6]

Case Report

A 42 year old male patient reported to the department Conservative dentistry & Endodontics, with the complaint of fractured disto -lingual cusp with respect to left mandibular second molar tooth 5 days prior to the dental visit. Patient had no complaint of sensitivity and pain. On examination, disto-lingual cusp of tooth no.37 was fractured at the cervical level extending subgingivally, while the rest of the coronal tooth structure remained intact. There was no tenderness to percussion. Pulp sensibility tests were performed and tooth was showing delayed response. Hence root canal therapy with full coverage crown was planned. The tooth had inadequate interocclusal space for the modelling of a single ceramic crown. [Fig. 1] Dentin exposed at fracture site was very close to pulp chamber. The root canal treatment was performed under rubber dam with respect to 37. After the access cavity preparation was done using Endo access bur (Dentsply, Sirona, Dentsply India) and glide path using Proglider (Dentsply, Sirona, Dentsply India), root canals were negotiated and the working length was established using apex locator (Root ZX, J. Morita Corp, Tustin, California, USA) and confirmed with IOPA radiograph. Cleaning and Shaping was done using crown down technique. The Master Apical cones were selected and obturation was done by lateral compaction using AH Plus sealer (Dentsply, Sirona, Dentsply India) [Fig. 2]. Following the root canal treatment, the tooth (#37) was temporized with cavit(Manufacturers' details).

The vertical dimension of the tooth was less and masseter hypertrophy was seen. Hence a semi- conservative treatment approach with endocrown was decided. Since, the crown length was inadequate, crown lengthening procedure with electrocautery was performed to improve the ferule and define the crown margins. [Fig 3A, B], [Fig 4A, B]. Following electrocautery, the orifices were sealed with GIC (GC Gold Label, Universal Restorative, Tokyo, Japan) and the pulp chamber was reconstructed using flowable composite resin , 3M ™Filtek™ Z350 XT Flowable Restorative material to block the undercuts. Long bevels of 2^0 were given for all the internal walls. The finish line was kept supragingivally on the flattened occlusal surface except at the fractured area which was subgingival [Fig B]. Tooth preparation for endocrown by flattening the occlusal surface by 1.5 mm . Following which, upper and lower impressions were made by putty ,wash technique [Fig 5A,B] .Tooth was temporized with Cavit –G(3M ESPE) The endocrown was fabricated with base metal alloy. After the fabrication of the metal endocrown, the try-in procedure was carried out and the final endocrown was luted with Glass ionomer Type I cement(GC Gold Label, Luting and Lining Cement, Tokyo, Japan)

Occlusion was evaluated. Excess cement was removed using explorer and passing the dental floss through proximal surfaces and brought out horizontally from buccal cervical embrasure to clear off loose GIC particles.

Discussion

Endocrowns are now considered as a valuable treatment modality for the non-vital posterior teeth with minimal crown structure. The practitioner has to select the proper treatment options for the restorative management of devitalised teeth [7,19].

Endocrownsare reinforced prosthetic option for non-vital posterior teeth with short clinical crowns [3,18]. When majority of coronal architecture is lost, comprehensive crown coverage can beaccomplished using Endocrown[5,8]. Studies have stated that endocrownswork well in molar teeth, in terms of distributionof occlusal forces, esthetic rehabilitation, and bond strength [3,8, 9, 10, 11,12, 13].

The fabrication of endocrownis considered to be less complex when compared to fabrication of crowns with posts and cores. The preparation involves uniform bevellingof walls of pulp chamber, accompaniedwith securing a seal of the root canal orifices with a good restorative material and the placement of cervical margins with a chamfer design. The irregularities of the pulp chamber walls have to be uniformly reconstructed to prevent any undercuts to prevent the seating of the restoration. The interior surface of the endocrown, which is replica of the pulp chamber, aids in the mechanical retention. This design eliminates the need for post and cores, making the treatment to be as conservative as possible [10,12].

By maintaining the remaining healthy tooth structure, an endocrownpreserves adequate tooth structure with minimal preparationand strengthens remainder of dental architecture[15,16,17]. In a study conducted by Biacchi and Basting, they observed that endocrown restorations provided greater resistance to compression forces than the traditional full coverage posterior crowns supported on fiber posts[14]. This was in accordance with a study conducted by CHEN Binwen et.al, which concluded that ceramic endocrown transferred less stress to the teeth, thereby protecting the tooth structure [18,19].

Conclusion:

Based on current evidence, fabrication of endocrowns can be considered as a dependablealternativeto rehabilitate moderately mutilated non-vital posterior teeth. Moreover, metal endocrowns are more economical and conservative treatment options for root canal treated teeth. Nevertheless, long-term follow-up and prospective clinical studies are required to guarantee their universal success.

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Figures and Legends

Figure 1: Fractured lingual cusp with respect to 37.

Figure 2: Root canal treatment with respect to 37.

Figure 3(A): 37 following root canal treatment

Figure 3(B): 37 following root canal treatment: Occlusal view

Figure 1: Preoperative and clinical photographs with respect to 37

Figure 4(A): 37 Crown lengthening procedure using elcetrocautery

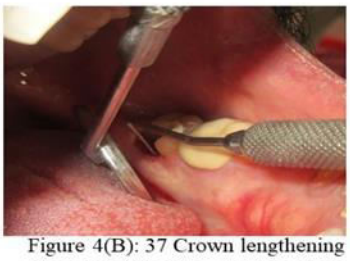

Figure 4(B): 37 Crown lengthening procedure following elcetrocautery

Figure 5(A,B): Rubber base impressions were done of the preparation followed by pouring of casts with respect to 37.

Figure 6: 37 Final Metal Endocrown on the cast.

Figure 2: Clinical photographs for the fabrication of metal endocrown

Figure 7: Final Metal Endocrown

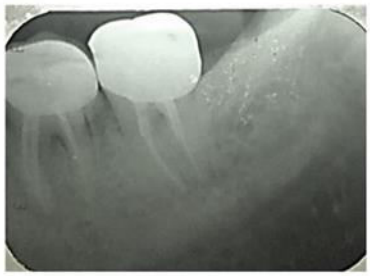

Figure 8: One year followup of Final Metal Endocrown

Figure 9: Two year follow-up of Final metal endocrown

Figure 3: Follow-up of metal endocrown (37) at 1 year and 2 years

Legends

Figure 1: Preoperative and clinical photographs with respect to 37

Figure 2: Clinical photographs for the fabrication of metal endocrown

Figure 3: Follow-up of metal endocrown (37) at 1 year and 2 years