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A NEW APPROACH FOR RESTORATION OF ENDODONTICALLY TREATED TEETH; CROWNLAY: A CASE REPORT.

Dental Science

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ABSTRACT

Root canal treatment is said to be completely successful when the tooth is restored and comes back to normal function. A tooth more complex restoration is required after endodontic treatment when compared to normal tooth restoration, because of factors such as extensive caries, post-treatment root canal dentin and even the economics condition of the patient. Crownlays are modiefied version of Endocrown that alternative that can be used by a dentist in performing post endodontics restoration and can be used as an alternate to post and core restorations. Similarly, to endocrowns, it works on the monoblock (Single unit) Phenomenon has enhances the strength of the tooth structure along with the benefits of ceramic restorations. Thus, the aim of this case report is to present conservative posterior crownlays planned to restore multi-rooted teeth that presented endodontic treatment and extensive coronal destruction.

KEYWORDS

Crownlay, Endodontics, Restoration

INTRODUCTION:

Endodontically treated teeth are structurally compromised as a result of loss of tooth structure due to caries, iatrogenic cavity preparation, and dentin dehydration.[1] There exists a direct relationship exists between the ability to resist occlusal forces and the amount of remaining tooth structure. It is vital to provide a post endodontic restoration allowing cuspal coverage as soon as possible to prevent fracture of endodontically treated teeth.

A decision to provide a full crown or an onlay depends on the remaining tooth structure; if the cuspal width to length ratio is 1:2 or more, an onlay can be placed. [2] Cuspal coverage can be provided without complete reduction of axial tooth surfaces or subgingival margins through restorations like onlays, partial coverage crowns, vonlays and endocrowns. [3]

One of the limitations in post and core restorations is the actual removal from the radicular structure to place the post which might weaken the root and make it more susceptible to fracture. Also, another limitation to the use of intraradicular posts are calcified root canals, narrow canals, or a fracture of an instrument, have led dentists to think of other alternative. [4]

In recent times, with the advancement of adhesive cements to ceramic restorations, restoration of endodontically treated teeth has shifted from tradition posts and core to alternative ways such as Onlays, Endocrowns, Vonlays, Crownlays. A crownlay which is a modification of an endocrown is a hybrid dental restoration typically placed over an endodontically treated tooth that is more conservative than a normal full coverage crown, but less conservative than a normal onlay.(5)

Crownlays incorporate an extension of extra restorative material on the underside of the restoration into the excavated pulp chamber following root canal therapy, taking advantage of the extra surface area afforded in this space on the interior aspect of the preparation, thereby sparing the external walls from needing as much tooth reduction. The use of a crownlay results in the conservation of more healthy, natural tooth structure than is otherwise possible. (6)

Similar to Endocrowns, Crownlays present several advantages over posts and cores and full coverage crowns, they are easier to prepare and apply and requires lesser clinical time and visits. Esthetic properties are also incomparable. Also, it adheres to the tooth structure on Monoblock Phenomenon. [7]

The purpose of the present paper is to present a clinical case, in which an esthetic and conservative posterior crownlays are used to restore multi-rooted teeth that presented endodontic treatment and extensive coronal destruction.

Case Report:

A 29-year-old male was referred to the Department of Conservative Dentistry and Endodontics at M.A.Rangoonwala College of Dental Sciences and Research Centre, Pune . He suffered from gross crown destructions and needed to have maxillary 1st left Molar and mandibular 1st molar restored due to caries. (Figure 1 and 2) Radiographic and clinical examinations were performed initially, to check the amount of remaining tooth structure and the apical status of the previous endodontic treatment. The patient's oral hygiene was acceptable and a favourable occlusion after which crownlay restorations was recommended because of the amount of remaining tooth structure and the thickness of the walls. The prosthetic decision was to restore tooth (26 and 36) with crownlays fabricated from monolithic lithium disilicate (IPS e.max). Prior to commencement of preparation, shade selection was done.

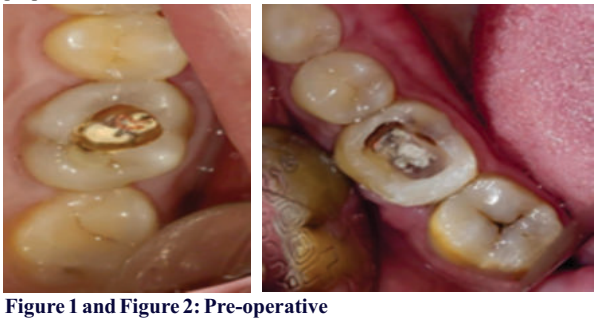

Figure 1 and Figure 2: Pre-operative

Crownlay Technique:

The aim was to achieve overall reductions in the height of the occlusal surfaces of at least 2 mm in the axial direction and to get a Occlusal table or "Occlusal sidewalk" in the form of a butt joint. Occlusal Preparations were done using a flat ended tapered diamond bur to achieve a shoulder finish line for the seating of the ceramic crowlays. Axial preparation using a tapered bur included only removal of undercuts from the access cavity. Total occlusal convergence of 7° to create continuity between the coronal pulp chamber and endodontic access cavity similar to that of an endocrown was prepared. Finishing of the preparations were done using fine grit finishing bur. (Figure 3,4 and 5)

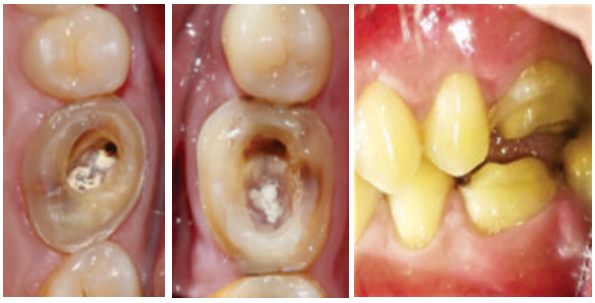

Figure 3,4 and 5: Tooth Preparation

After the completion of tooth preparations impressions were made with polyvinyl siloxane impression material of light and putty consistency using a double-mix single-stage technique using a triple tray. (Figure 6 and 7)

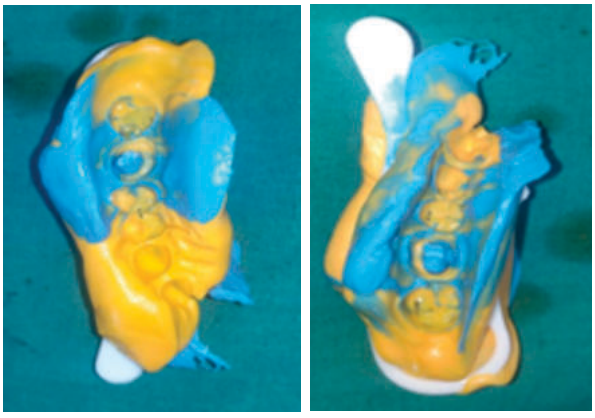

Figure 6 and Figure 7: Triple-tray Putty Impression

The Lithium Disilicate was milled using CAD/CAM milling technique. (Figure 8) After verifying the fit, the crownlays was cemented intraorally using resin luting cement.

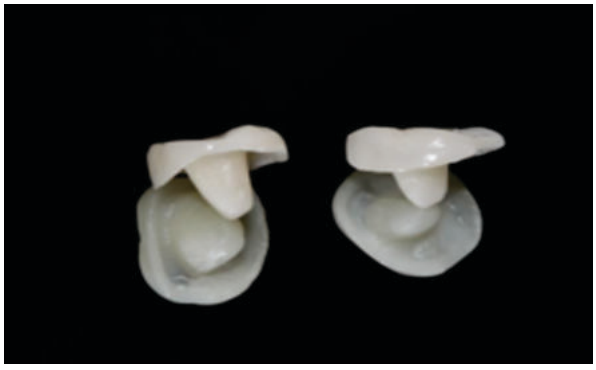

Figure 8: Fabricated E.max Crownlays

The inner surface was etched with 10% hydrofluoric acid was washed with water and dried. Silane coupling agent was applied for 1 min and dried. The tooth was etched for 10 seconds and washed and dried using botting paper. Adhesive was applied and cured for 20 secs.

Resin cement was applied on the inner surfaces and crownlays was cemented using light cure. The gross occlusal discrepancies were marked with articulating paper strips and later removed before cementation. Post cementation radiographic view showed appropriate seating of the crown. (Figure 9,10 and 11)

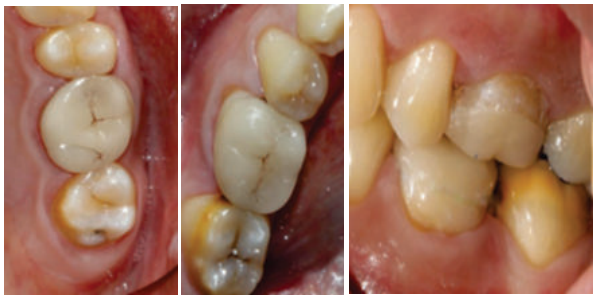

Figure 9,10 and 11: Post-Cementation

DISCUSSION:

There are two broad categories of fixed dental prothesis; old category known as conventional restorations that depend on frictional or mechanical retention and recent category known as minimally invasive MI or adhesive restorations that depend on adhesives. Nowadays, selecting the best restorative option for posterior teeth is a challenge because of many minimally invasive restorations available. The rationale behind Ceramic onlays, Endocrowns and Crownlays is that a monolithic ceramic bonded restoration with a butt joint keeping as much as possible enamel for improved adhesion.[8]

Concept of Crownlays are similar to endocrown, however they are minimally invasive preparations than endocrowns. Crownlays and Endocrowns will invade the pulp chamber only thus the remaining dentin of the root canal is not affected. The pulpal chamber shape and cavity warrants stability and retention. [5,9] The objective of the preparation is to get a wide and stable surface resisting the compressive stresses that are frequent in molars. The prepared surface is parallel to the occlusal plane to provide stress resistance along the major axis of the tooth. [10] Retention in endocrowns are achieved through the pulp chamber. However, stress distribution is lower in crowlays than that of a traditional crown as less tooth structure preparation thus more tooth structure is available for stress distribution. [4,6,11]

The post and core buildup serve to aid in retention of a traditional crown but increase the likelihood of root fracture because chewing forces are directed vertically along the hollowed out and subsequent weaker remnants of the internal surfaces of an endodontically-treated (root-canal-treated) tooth. [12] Crownlays are typically constructed from milled, monolithic blocks of solid porcelain which not only very intimately fit the prepared tooth, but are acid etched and bonded into place using very strong resin materials, decreasing the need for physical retention. [6]

Unfortunately, too many research articles are not published on crownlays and clinical as well as research evidences should be made for this new technique. A proposal is to be also be made in the near future for the change in name from Crownlay to Hu-crown in the near future.

CONCLUSION:

The Crownlays represents a very hopeful treatment alternative for endodontically treated molars, it allows maintaining of tooth structure, it is compatible with minimally invasive dentistry, and it is adequate for the concept of biointegration. It is a conservative approach for mechanical and aesthetic restoration of nonvital posterior teeth. Thus, crownlays can be an excellent alternative to post and core post endodontic restorations in the near future.

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