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VONLAYS- FLIPSIDE TO FULL COVERAGE CROWNS FOR ENDODONTICALLY TREATED MOLARS-A CASE SERIES

Pallavi Sinha, Kavita Dube*, Shiv Mantri, Bonny Paul, Swati Singh.

***Corresponding Author:** Dr Kavita Dube
*Professor, Hitkarini Dental college and Hospital, Jabalpur, India . 482001, drkdube@gmail.com

Abstract
Indirect restorations that include onlays and veneers have been a certainly accepted treatment modality in the field of restorative dentistry. Porcelain veneers and onlays that are used in anteriors and posteriors respectively have contributed much to the minimal invasive preparation of tooth in contemporary dentistry. Also with advent of latest technologies such as CAD/CAM heat press, the indirect restorations are not only aesthetic but also possess high strength to bear heavy occlusal forces of posterior teeth. Keeping endodontically treated teeth in view a more complex restoration is required when compared to normal tooth restoration, because of extensive caries, losss of pericervical dentin and even the financial condition of the patient .One such design is “Vonlay”. It is a combination of an onlay with an extended buccal veneer surface. This restorative option requires a much less invasive preparation than a full coverage crown but provides the same structural and functional benefits. This paper aims to discuss a series of three cases on Vonlay following endodontic treatment of mandibular molars.

Keywords: Vonlay, Minimally Invasive Treatment, Restorative Dentistry

INTRODUCTION

Preservation of tooth structure is crucial for the survival of tooth after endodontic treatment. Conventional tooth preparations for full coverage crowns especially for porcelain fused metal involve excess loss of enamel and dentin in order to furnish the required margins and finish lines. Hence the routine tooth preparations are more invasive that can be detrimental for the performance of tooth overtime.[1]

The advanced fabrication like CAD/CAM and heat pressing have enabled dentists to deliver highly esthestic restorations that seamlessly blend with the existing dentition. Besides the aesthetic quotient these restorations possess high strength that can withstand heavy occlusal forces even in thin sections. The contemporary materials such as Zirconia and Lithium Disilicate have gained a wide popularity for their aesthetic appeal and stress bearing capacity.[2]

It is entirely the discretion of the clinician for the type of restoration of an endodontically treated tooth. Keeping minimal invasion for tooth preparation in consideration, vonlays stand a good alternative to full coverage crowns. For a restoration in an endodontically treated tooth there is much more internal stress created in the dentin in comparison to a restored vital tooth. The internal stresses are the prime reason for the failure of restoration ,hence onlays are better restorative option for structural integrity and stress distribution.[3] With regard to the selection of composition the ceramics formulated with quartz porcelain, mica-filled silica, Zirconia, or lithium disilicate are all

used in contemporary dentistry with very high credibility[4] The refined form of ceramics in onlay restorations permit less invasive preparation outline. The outcome of such restorations that are pellucid thus highly aesthetic and have outstanding marginal durability, proper proximal contacts, demonstrate least dwindling and do not affect the opposing tooth.[5]

Veneering is one of the most acceptable indirect restoration for anteriors being widely practiced.One of the most used and credible options for gaining a long term aesthetic correction has been the porcelain veneer.Various indications for porcelain veneers include intrinsically or extrinsically discolored teeth ,those that have been worn, traumatized, or broken. All-ceramic veneers, irrespective of their laboratory fabrication technique, contribute to dimensional strength, durability and most suited appearance. [6]

There are multiple materials and methods to rehabilitate a tooth. Vonaly is a restorative option that provides the same structural benefits as full coverage crowns but with lesser preparation and invasion.[7] The combination of a buccal veneer over the onlay renders the restoration mechanically more retentive on to the tooth structure. Hence the criteria of durability and esthetics are fulfilled by this preparation. The purpose of this article is to present a report of three cases rehabilitating molar with vonlay restoration post endodontic therapy.

METHOD OF PREPARATION AND CLINICAL CASES

The study reports the clinical cases whereby the patients reported to the the department of conservative dentistry and endodontics for the pain in lower tooth. After thorough radiographic and clinical screening to check the amount of residual tooth structure and presence of pulpal involvement ,endodontic treatment was proposed to the patient and likewise carried out. Keeping the patients oral hygiene and favourable occlusion under consideration, an aesthetic yet conservative indirect restoration i.e monolith zirconia vonlay,Y-TZP(Yttrium stabilised tetragonal zirconia particles) (solid plus zirconia)was proposed to the patient as an alternative to full coverage crown. With the patients consent monolith zirconia vonlay was planned for the molars. The selection of shade was done aptly before the tooth preparation.

OCCLUSAL PREPARATION FOR ONLAY

The occlusal surfaces of the subjected tooth was reduced to at least 2mm in the axial direction so as to attain an occlusal table. Occlusal Preparation was done using a flat ended tapered diamond point to achieve a shoulder finish line. After the occlusal reduction modelling wax strip was inserted in between the prepared and opposing tooth, its thickness was then measured with verniers calliper to confirm the adequate occlusal clearance of about 2mm.

BUCCAL VENEER PREPARATION

Depth grooves were placed on the buccal surface using diamond depth cutting bur. Tooth preparation of buccal aspect of tooth was done using a tapered diamond point of round end cutting to procure a chamfer margin for seamless blend of restoration with the natural tooth.. Proximal reduction was performed. Using the above mentioned diamond point preparation of proximal surface was carried out without breaking contact area with respect to the adjacent tooth. Fine grit diamond points were used for refining the design and outline. After the completion of tooth preparation impression was made with polyvinyl siloxane impression material of light and putty consistency using a double-mix single-stage technique. The zirconia vonlay after milling was tried in for fit on the prepared tooth. Inner surface of the restoration was sandblasted.The adhesive(Scotchbond Universal 3M ESPE) was applied on the prepared tooth surface and light cured for 20 seconds. Resin cement(Rely X Ultimate 3M ESPE) was applied on the intaglio surface of the restoration after which the restoration was placed on the prepared tooth and light cured for 20 seconds per margin of vonlay.

CLINICAL CASE I- VONLAY RESTORATION ENDODONTICALLY TREATED 37

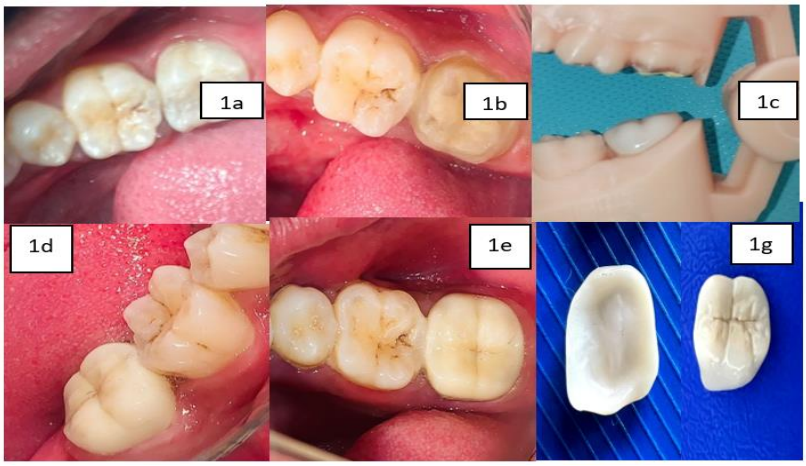

Figure 1:1a -Preoperative , 1b- Tooth Preparation, 1c -3D Printed Resin model ,1d- Postoperative-buccal view ,1e- postoperative -occlusal view, 1f- vonlay under surface, 1g- Occlusal surface

CLINICAL CASE II- VONLAY RESTORATION ENDODONTICALLY TREATED 46 AND 47

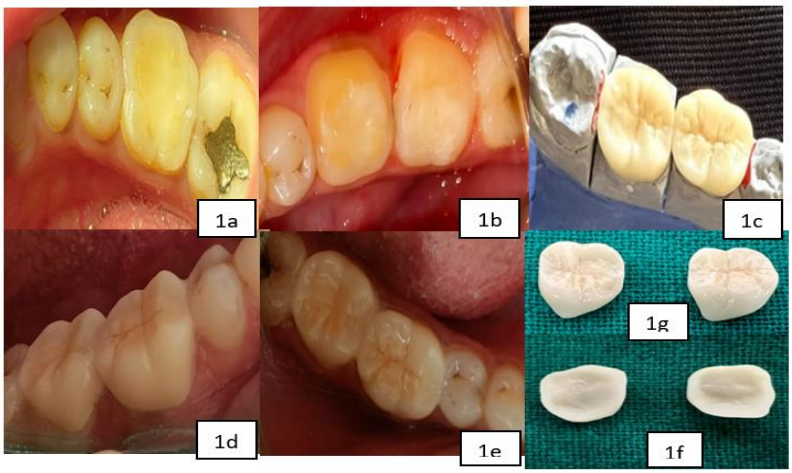

Figure2: 1a -Preoperative , 1b- Tooth Preparation, 1c -3D Printed model ,1d- Postoperative-buccal view ,1e -postoperative -occlusal view, 1f- vonlay under surface, 1g- Occlusal surface

CLINICAL CASE III- VONLAY RESTORATION ENDODONTICALLY TREATED 36

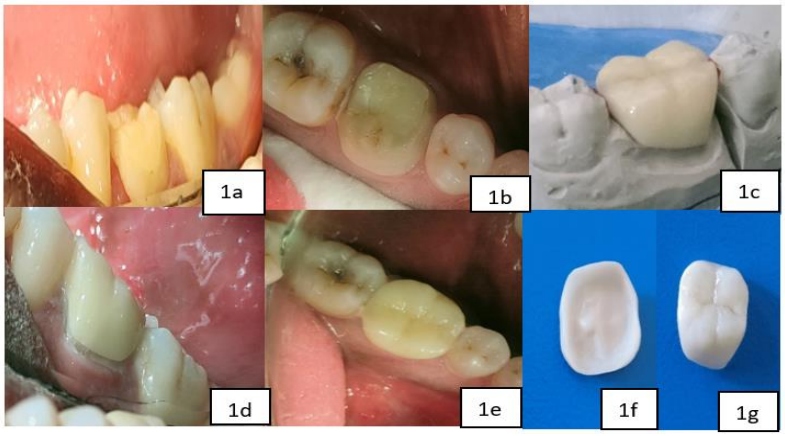

Figure3 : 1a -Preoperative , 1b- Tooth Preparation, 1c -3D Printed model ,1d-Postoperative-buccal view ,1e- postoperative -occlusal view, 1f-vonlay under surface, 1g- Occlusal surface

DISCUSSION

There are several ways to simulate the form and function of indirect restorations to the original tooth. Also there are various materials and fabrication procedures available for indirect restorations especially after endodontic treatment.There is a paradigm shift in recent years to the concept of "minimally invasive" dentistry, which implies conserving maximun possible tooth structure, hence drifting away from highly invasive techniques of tooth preparation. The vonlay approach depicted in the present case has all the benefits of a conventional crown along with minimal tooth preparation.

Vonlay was very first documented by Reg 20 years back where the author had used feldspathic porcelain as the material of choice for vonlays.However the restoration could not catch a good hold in the field of dentistry due to lack of advancement in bonding technolgy.[8] As the processing technologies have progressed to CAD/CAM and heat pressing, the options for dentists have multiplied to deliver to the patients. Thus the indirect restorations fabricated with the present materials and technology are highly aesthetic and have the ability to bear heavy occlusal forces in the posterior region. The area that is subjected to the maximum stress is cervical area especially the dentin below cemento- enamel junction.[9] Nadig RR stated that a stress of 25 MPa for full coverage restoration, 15.7MPa for onlay and 13.1MPa for vonlay was evident in the cervical third of radicular dentin below CEJ that was on contrary to that seen for a sound tooth, where dentin coronal to CEJ was profoundly burdened.[10] The most prone site for cracks and fracture is below the margin of full coverage restoration. Table top and vonlay preparation conserves the pericervical dentin, hence there is a better dissemination of stress on an intact tooth. Amal Mamdouh et al have opined that teeth with the substantial amount of preserved tooth structure and ones restored using adhesive bonding showed better dissemination of stress and high resistance to fracture.[11]

Ceramic vonlays can be computer-assisted design/computer-assisted manufacture (CAD/CAM)-milled and sintered from blocks, or heat-pressed from ingots. Milled ceramics are usually recommended for low occlusal force areas, as their strength is less than than their pressed counterparts (approximately 360 MPa for milled restorations versus 400 MPa for pressed restorations). Hence, the latter type of restorations stand suitable for the premolars and molars.[7] Mostly a monolithic restoration manufactured from zirconia or lithium disilicate is preferred. A high success rate of 99 percent survivability has been noted on yearly basis for premolars were there is ample enamel remaining for adhesive bonding [12]

CONCLUSION

In contemporary dental practice most of the tooth rehabilitations after endodontic therapy can be accomplished conservatively.More natural looking and high-toughness restorations are becoming economical and are able to be more swiftly processed due to betterment in technology . Vonlay is another such example of indirect ceramic restorations that offers a treatment option that can suit patients aesthetic needs while also restoring the dental form, preserving structurally significant dentin, and protecting the remaining tooth structure.

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