Bonded ceramic inlays or full coverage crowns? – a review and case report

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ABSTRACT

The esthetic demands of the patient have to be combined with conservative treatment procedures to deliver functional restorations for endodontically treated teeth. Ceramic inlays, fabricated in lithium dislicate material, satisfy both these requirements as post-endodontic restorations.

This paper demonstrates a simple, esthetic and conservative alternative to full coverage crowns for the restoration of endodontically treated teeth.

Keywords: Esthetic, Ceramic, Inlay

INTRODUCTION

Significant loss of the tooth structure is a common clinical problem following dental caries and endodontic treatment. This compromises the structural integrity of the tooth and increases its chances of fracture. Traditionally, a full coverage restoration is used to restore a tooth functionally and esthetically. However, a full coverage crown has been known to lead to secondary caries and fracture of the underlying tooth.[1] Over the last few years due to increased esthetic demands and the need for conservative procedures, there is an increased interest in all ceramic inlays for the restoration of endodontically treated teeth.[2]

In the past, inlays were used for restoration of mutilated and carious teeth. The materials commonly used were base metal alloys and gold alloys. The wedging effect and the unesthetic appearance of the metal inlays and the high cost of the gold alloys led to the emergence of all ceramic inlays as the material of choice. The advantages of ceramic inlays are their high esthetic value and the ability to bond to the teeth.[3,4,5]

IPS Empress II system (IVOCLAR VIVADENT, SCHAAN, LIECHTENSTEIN) introduced to the world of dentistry in the early nineties was previously used for the fabrication of ceramic inlays. However studies have shown that this material has limited physical properties and flexural strength[6]. IPS E.MAX material (IVOCLAR VIVADENT, SCHAAN, LIECHTENSTEIN) which is made up of lithium disilicate glass ceramic and supplemented with a universally applicable nano-fluorapatite glass-ceramic to veneer all the IPS E.MAX system components is now being used in place of IPS Empress II ceramic material as a common all-ceramic material.[7]

This article describes a case report of the use of a ceramic inlay instead of a full coverage crown to restore the function of an endodontically treated tooth.

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CASE REPORT

A 23 year old female patient was referred to the department of Prosthodontics at M.A. Rangoonwala Dental College and Research Centre from the Department of Conservative Dentistry and Endodontics for post endodontic restoration of the maxillary left second premolar tooth. (Fig: 1) The clinical examination of the tooth showed that there were intact facial, lingual and mesial walls following endodontic treatment. The distal wall of the tooth was missing due to caries. The tooth had a short clinical height. The patient desired an esthetic restoration and it was decided to place a ceramic inlay instead of a porcelain fused to metal crown to restore the tooth keeping in mind the short clinical crown height and the esthetic demands of the patient.

The tooth preparation for the ceramic inlay was performed using diamond burs. (DIA-BURS, MANI, INDIA) as per the protocol mentioned by Swift et al.[8]

(Fig: 2) Care was taken so that the preparation was as conservative as possible and an intact enamel border was available at the cervical floor of the preparation. The final impression of the tooth preparation was made using addition silicone material. (3M EXPRESS™ VPS IMPRESSION MATERIAL, 3M ESPE, USA)

The final restoration was fabricated in IPS E.MAX lithium disilicate material (IVOCLAR VIVADENT, SCHAAN, LIECHTENSTEIN). (Fig: 3) The restoration was checked for fit and accuracy. It was etched with hydrofluoric acid (IVOCLAR VIVADENT, SCHAAN, LIECHTENSTEIN) for 20 seconds and a silane coupling agent (RelyX™ Ceramic Primer, 3M ESPE, USA) was applied.

The final restoration was bonded to the tooth using RelyX™ U200 cement (3M ESPE, USA). (Fig: 4) The occlusion was adjusted and it was polished using diamond burs, polishing disks and strips. The restoration was examined and scored according to the modified United States Public Health Service (USPHS) criteria of Ryge.[9]

The authors have successfully treated numerous patients using this conservative protocol and are awaiting results of a clinical trial.

Fig-1: Pre treatment presentation

Fig-2: Tooth preparation

Fig-3: Lithium disilicate inlay on model

Fig-4: Bonded inlay in situ

DISCUSSION

Determination of the optimum type of post endodontic restoration depends on the residual tooth structure and the functional requirements of the tooth.[10] With recent advances in adhesive systems, the concept of minimal intervention dentistry has been introduced to preserve sound tooth structure. Adhesive restorations have higher ability to transmit and distribute functional stresses through the bonding interface to the tooth which helps to reinforce the remaining tooth.[11]

A ceramic inlay may be preferred over porcelain fused to metal crown due to various reasons, primarily due to the conservative tooth preparation required for fabricating the inlay. A second critical reason is esthetics. In porcelain fused to metal crowns, the grey colour of the metal substructure has to be masked by placing a layer of opaque ceramic material. Ceramic inlays are fabricated from translucent ceramic materials and therefore have better esthetic properties. A dark line along the

gingival margin, compromised periodontal health are more likely to be seen in porcelain fused to metal crowns as compared to the use of ceramic inlays.[1,12,13] Chipping/delamination of the veneering ceramic seen in porcelain fused to metal restorations is frequently a clinical complication which is eliminated by the use of lithium disilicate restorations.[14]

Gupta et al have shown that ceramic inlays are viable alternatives to full coverage crowns.[15] Other in-vitro studies have shown that that all ceramic inlays placed in posterior teeth provide a highly successful esthetic restoration.[16,17]

A limited number of studies have been carried out using IPS Empress II system (IVOCLAR VIVADENT, SCHAAN, LIECHTENSTEIN) as the core material for the fabrication of ceramic inlays.[18,19] However, there is no literature on the use of modern lithium disilicate inlays to assess their clinical performance. The authors are presently carrying out a clinical trial on the same and the results are promising.

The literature also does not report on how much tooth structure must be destroyed to decide between an inlay and a full coverage crown as the post endodontic restoration. Clinical trials are needed to determine the extent of destruction that warrants a crown and not a partial coverage restoration.

CONCLUSION

Ceramic inlays have many advantages as compared to porcelain fused to metal crowns for restoration of endodontically treated teeth and should be considered for the same in cases where tooth destruction may not warrant the use of an endodontic post or full coverage crown.

DISCLAIMER

The authors state that there is no financial interest of any from in any product or company mentioned in the article.

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