Esthetic Replacement of Missing Antetior Tooth with All Ceramic Restoration (IPS E.max Cad) – A Case Report

Praveen P[1], Ragavendra Jayesh[2], Sanjna Nayar[3].

[1]Final year, Post Graduate, [2]Principal, [3]Head of the Department, Department of Prosthodontics, Sree Balaji Dental College & Hospital, BIHER

Abstract

In Dentistry, ceramic restoration has become more popular among other dental restorative material, because of its superior esthetics, good biocompatibility as well as excellent mechanical and physical properties. Among dental ceramics -Lithium Disilicate (LD) glass ceramics and Polycrystalline Zirconium Dioxide Ceramics are used as a dental biomaterial and also the material of choice for esthetic replacement of missing anterior teeth.These materials exhibit better esthetics, color stability, biocompatibility as well as better strength. Theyact as a most promising restorative materials because it has favourable mechanical and physical properties compared to other restorative materials.

Keywords*; all ceramic, lithium disilicate, zirconia ceramic. esthetic, biocompatibility*

Introduction

Fixed denture prostheses are the treatment option, used to replace damaged or missing teeth or teeth that have been lost. They are attached to prepared abutment teeth using restorative cement material so that they cannot be removed. In 1960s, metal ceramic has been considered as the gold standard of crown and bridge because of its satisfactory mechanical and physical properties as well as its esthetics results and marginal adaptations which is clinically acceptable[1].

In recent decades, increasing demand from patients for natural-appearing and bio-safety reasons, metal free restoration hasled to the development of all-ceramic materials with improved mechanical characteristics that ensure suitable longevity. These restorative materials are now replacing traditional metal-ceramic restorations. Among dental ceramics - Lithium disilicate (LD) glass ceramics and Zirconia ceramic are the material of choice for esthetic replacement of missing anterior teeth.

Lithium disilicate is a glass ceramic with a unique structure and can be produced by means of both pressable and Computer Aided Design-Computer Aided Manufacturing (CAD-CAM) processing. It shows good mechanical properties (flexural strength 350 - 450 MPa), has excellent translucency and is more suitable than zirconia ceramic especially in esthetic areas[2].

A Case Report

A 24 years, male patient came to the Department of Prosthodontics, Sree Balaji Dental College & Hospital with a chief complaint of missing tooth in upper front jaw region for past 1 year. The patient presented no significant medical history.

Clinical examination revealed that maxillary left central incisor was missing (fig.1and 2) and the tooth was extracted due to trauma before 1 year. On radiographic assessmentrevealed that presence of adequate bone support from abutment teethand sufficient amount of space available for either fixed or removable prosthesis.

Corresponding Author:
Dr. Sanjna Nayar
Head of the Department
Department of Prosthodontics,
Sree Balaji Dental College & Hospital
Velachery Main Road Narayanapuram - Pallikaranai
Chennai-100, Email: nayarsanjna@gmail.com

Possible treatment options are fixed or removable prosthesis. Patient wants fixed restoration, so removable treatment plan was eliminated. Patient also need not wants any invasive treatment procedure (Dental implant) hence various fixed treatment options were discussed with the patient and replacement of the missing tooth was planned with conventional fixed partial denture. The patient signed the informed consent, and accepted the treatment plan for fixed partial denture.

Procedure

The primary impression was made with irreversible hydrocolloid (fig.3) impression material (Zhermack-tropicalgin, BadiaPolesine[Rovigo] Italy). The cast was poured in type-3 dental stone (DPI, Mumbai, Maharashtra, India). After the primary casts obtained, it was mounted in a articulator and wax mock-up was done. Then the putty index was made.

A conventional tooth preparation was done in maxillary 11 and 22 incisor region (fig.4) Shoulder type finish line was given in 11 and 22 regions for all-ceramic restoration. For all – ceramic restoration, the tooth preparation in 11 and 22 regions need1.5 to 2mm labiolingual reduction and 2mm incisal reduction. Flat-end tapered diamond was used for shoulder type of finish line. Before tooth preparation shade selection should be done.

Once the tooth preparation has been done, retraction cord was placed for retraction of gingival tissue. Then the master impression was made. The material of choice used for impression procedure were Zhermack elite HD+ soft putty and Zhermack elite HD+ normal set light body (fig.5), using the double mix technique. For better esthetics and phonetics, tooth colored provisional restoration(fig.6) was given in maxillary anterior region. The impressions were poured using type IV dental stone. The restorative crowns were designed and fabricated using CAD – CAM technology. After fabrication of permanent prosthesis, it should be checked in patient mouth for better adaptation and shade matching, then the all ceramic restoration was cemented(fig.7) using 3M ESPE RelyX^{TM} U200 resin cement.

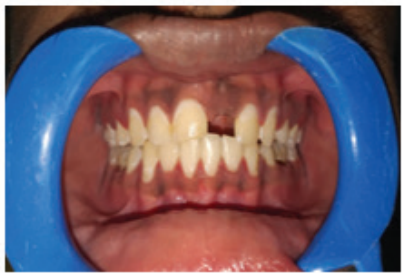

Fig 1: Intra Oral Examination

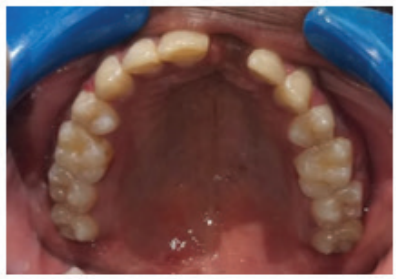

Fig 2: Occlusal view

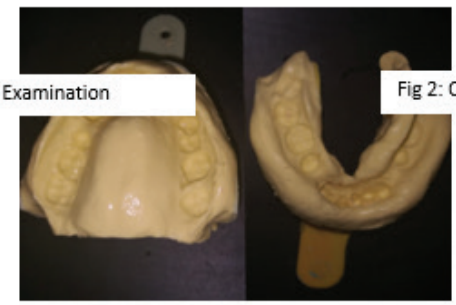

Fig 3: Diagnostic impression

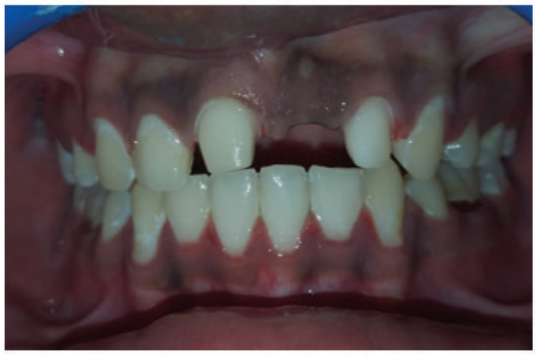

Fig 4: Tooth preparation

Fig 5: Master impression

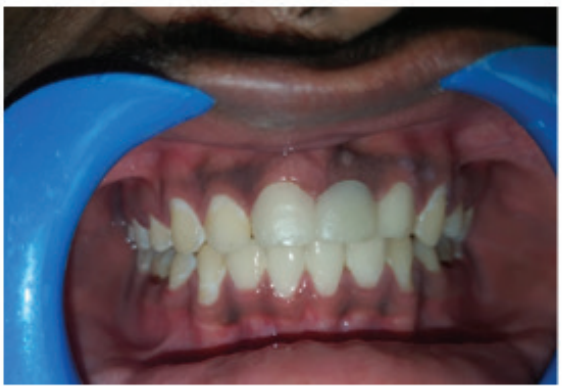

Fig 6: Temporary restoration

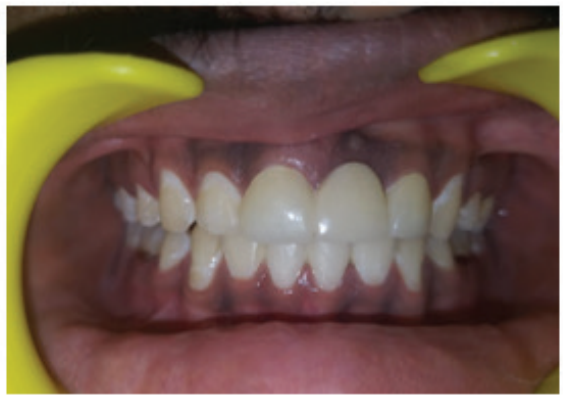

Fig 7: Permanent restoration

Fig 8: Post-

Discussion

The replication of natural teeth in anterior region for patients having high esthetic demands has become more challenge for dentists. The reproduction of the color in the cervical portion is more challenging because a thinner layer of material must be used to prevent harm to the pulpal tissue and also most critical area for selecting the color shade in fixed prosthesis. Shade selection is an important factor because the color of a restoration should be indistinguishable from that of the adjacent teeth. The color matching of a restoration is determined by the core materials, porcelain thickness, fabrication process, and by surface properties such as texture[3].

In recent decades, the demand for better estheticsby the patient had increased over the year. The tooth color restorations like all ceramics and composite material play a major role in fulfilling the esthetics demand of the patient. The use of all ceramic restorations has increased

due to its superior esthetics, color stability, and its biocompatibility[4].

Lithium disilicate is a glass ceramic with a unique structure. This material has glass ceramic phase in which crystalline fillers are added during manufacturing to improve the strength, thermal expansion and contraction behaviour of ceramics. The crystalline phase of $Li_2Si_2O_5$ makes for up to 70% of the material, grows by nucleation and forms many randomly oriented interlocking crystals, contributing to the superior strength (flexural strength of 350 – 450 MPa) than the alumina or leucite ceramics. The crystalline phase orientation could also cause crack deflection and blunting, accounting for the improved strength.

It has excellent translucency due to good compatibility between the glass ceramic phase and the crystalline phase which keeps internal light scattering within the material to a minimum. Highly esthetic results can be achieved with this material.

It is commercially available as ingots that can be pressed to obtain full-contour forms or sub-structures, as milling blocks that can be milled by CAD-CAM technology, and also act as a veneering material that can be hot pressed onto all-ceramic frameworks[5].

Harda et al has reported that lithium disilicate is more translucent than zirconia, which means the superior esthetic property of monolithic lithium disilicate[6].

Conclusion

From this clinical report it was concluded that replacement of missing anterior teeth is more challenging one for the dentist. All ceramic restoration - Lithium disilicate (LD) glass ceramics and Zirconia ceramic are the material of choice for esthetic replacement of missing anterior teeth. Lithium disilicate is a glass ceramic with a uniquestructure. It shows good mechanical properties (flexural strength 350 - 450 MPa), has excellent translucency and is more suitable than zirconia ceramic especially in esthetic areas

Ethical Clearance – Not required since it is a case report

Source of Funding – nil

Conflict of Interest – nil

References

1. Accuracy of the marginal fit of all-ceramic crowns fabricated by direct and indirect digital scanning method: AAmelya, R W Odang et al. - IOP Conf. Series: Journal of Physics: Conf. Series 1073 (2018) 022011 doi :10.1088/1742-6596/1073/2/022011
2. In vitro Evaluation of the Marginal Fit and Internal Adaptation of Zirconia and Lithium Disilicate Single Crowns: Micro-CT Comparison Between Different Manufacturing Procedures: Francesco Riccitiello, Massimo Amato et al. - The Open Dentistry Journal, 2018, Volume 12 161
3. Influence of coping design on the cervical color of ceramic crowns: Gianluca Paniz, Ki-Ho Kang et al. - J Prosthet Dent 2013;110:494-500
4. Evaluation of marginal fit and internal adaptation of zirconia copings fabricated by two CAD - CAM systems: An in vitro study: The Journal of Indian Prosthodontic Society | Apr-Jun 2015 | Vol 15 | Issue 2
5. Rudd, Marrow, Sanjnanayar et al: Dental laboratory procedures, Fixed Partial Denture – volume 2
6. Lithium Disilicate Restorations: Overview and A Case Report: Qamheya AHA, Qamheya M - J Dent & Oral Disord - Volume 2 Issue 9 – 2016
7. Zirconia Crown as Single Unit Tooth Restoration: A Literature Review: Yasser Alfawaz – The Journal of Contemporary Dental Practice, May 2016; 17(5):418-422
8. An in vitro evaluation of marginal fit zirconia crowns fabricated by a CAD-CAM dental laboratory and a milling center: AviMeirowitz, YoliBitterman et al. - Meirowitz et al. BMC Oral Health (2019) 19:103.