Newer trends in esthetics with direct and indirect veneers: A case report

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Abstract

Esthetics play an important role regarding the personality of individuals and has a definite influence on their psychosocial well-being. There exist myriads of conditions causing both intrinsic and extrinsic discolouration of human dentition which have been routinely treated with both direct and indirect techniques. Dental Laminates have been the widely accepted treatment protocol in the correction and esthetic rehabilitation of discoloured Dentition.

The dynamic field of esthetic dentistry has been constantly evolving with the introduction of newer technology and innovations for restoration of discoloured teeth. Various treatment modalities exist in the rehabilitation of discoloured dentition such as Direct Composite veneering, rehabilitation with partial and full coverage Crowns, fabrication of All Ceramic Laminates which still remains the gold standard in treatment owing to their conservative and high esthetic properties. This case outlines a Novel approach to treat Fluorosis using CAD-CAM ceramic veneers of the Indirect Technique to restore the maxillary Anteriors and a Direct Indirect Chair side technique integrating preformed Composite Laminates termed Componeers to rehabilitate the lower anterior teeth.

Keywords: All Ceramic Laminates, Fluorosis, Componeers, Indirect-Direct technique.

Introduction

The growing trends in the demand for esthetics and the evolutionary development of restorative materials have revolutionised various treatment modalities for restoration of discoloured teeth. Esthetics is of prime concern to the patient to increase their self-confidence and self-esteem. The discolouration of teeth with extrinsic and intrinsic stains contributes a major psychological impact both in personal and professional life. The effect of fluoride on the teeth was first documented in 1916 by Mc Kay and G.V. Black.^[1,2] Dean classified Dental fluorosis into different categories depending on the severity.^[3] There are different methods of restoration of anterior teeth with direct or indirect techniques. The ceramic veneer technique was introduced to the dental profession in the 1980s by Dr. John Calamia as bleaching had limitations in treating discolorations and malformed teeth.^[4] The success of veneers depends on the type of material, minimally invasive tooth preparation and proper application of luting agents. With the development of newer materials and techniques in the field of ceramics, All Ceramic laminates have evolved as a better treatment option for esthetics. Clinical studies have documented more than 10 years of Data with bonded laminate veneers.^[5-6] and observed that failure occurred in the form of fracture or marginal defects.^[7]

Componeers are a polymerized, prefabricated nano-hybrid composite enamel shell which warrant a conservative mode of tooth preparation are less time consuming and an inexpensive chairside technique compared to ceramic veneers. Componeers are a viable treatment option which has synergised the need for instant chairside Esthetics.

Case Report

An 18-year-old female patient reported to the Division of Orthodontics and Dentofacial orthopaedics with the chief complaint of severely stained upper front teeth, always using her hand to cover her mouth while laughing and loss of confidence. Extraoral examination revealed a straight profile with normal lip length and class I molar relation on the left and right side. Intra-oral examination revealed good periodontal health, generalized stains with Grade -II fluorosis in upper and lower Anterior teeth Fig (1) a dentate status with teeth missing in relation to 18,28,38,48.

Fig. 1: (a): Fluorosis present in the Anterior Dentition; (b): Visual Treatment Objective being explained to the patient;

(c): Direct Composite veneering done to show patient treatment outcome.

Radio diagnostic orthopantomography was carried out (Planmeca ProOne®) which revealed an impacted tooth in relation to 18,28,38, 48 and absence of restorations on any of these teeth. Various treatment modalities were explained to the patient and composites were placed on the anterior teeth as a visual treatment objective Fig. 1(b,c) and a definitive phase was carried out after the patient consented and approved the treatment.

The treatment plan was designed as to achieve optimum esthetics in a very short time frame keeping in mind the patients need to achieve instant and urgent esthetics. Definitive Prosthodontic rehabilitation was planned by using CAD-CAM milled all ceramic laminates in relation to the maxillary anteriors, and restoring the mandibular arch with the Componeers (Componeer TM BRILLIANT @Coltene whaledent).

Definitive treatment phase:

All Ceramic Laminates (Indirect Technique)

The Upper Anterior teeth (13,12 11,21,22,23) were taken up for All ceramic veneer preparation. Patient was explained about the difference in both Indirect and Direct procedures and the time taken for fabrication of CAD-CAM milled ceramic laminates.in the laboratory being an indirect veneer technique, Labial tooth preparation (Fig. 2a) was carried out with the help of putty index (Fig. 2b), depth marking burs and round end tapered medium grit diamond shoulder/chamfer preparation without an incisal overlap design. Finishing was done with a fine grit bur keeping the entire preparation in enamel to a depth of 0.3mm.

Fig (2a): Labial tooth preparation Fig (2b): Putty index Fig (2c): Prepared tooth surfaces Fig (2d): Rubber base impression

The tooth preparation was extended towards the interproximal area preserving the natural contact areas and gingival papilla. Gingival retraction was done using non impregnated knitted@ KnitTrax cord (000). Definitive

Impressions were made with Poly vinyl siloxane rubber base impression material of the Addition Type (Aquasil@DentsplySirona) , casts were scanned using an extraoral lab scanner (Ceramill Map 200+) and the standard tessellation language (STL) data was exported to a CAD software (Exocad) where virtual articulation and virtual designing of the copings was done (Fig 3a).

Fig 3: (a): Virtual designing of copings; (b): CAD-CAM milled ceramic laminates.

High translucent Pre stained zirconia (HT) (Ceramill Zolid (Preshade) - Amann Girrbach AG) discs (71mm diameter and 14mm thickness) were used for the milling process due to their excellent strength, rigidity and biocompatibility. The CAD-CAM milled All-Ceramic zirconia copings were put through a sintering phase, contoured and characterized with Feldspathic ceramics (Creation -CT) and the finished laminates were tried in and checked in both protrusive and excursive relations. The CAD-CAM milled all ceramic laminates were cemented using a self-adhesive RelyX Unicem (3M ESPE) (Fig 3b). A light-cure resin cement (Variolink Esthetic LC, Ivoclar Vivadent) was applied to veneers and simultaneously seated. The excess of cement was removed with a floss in the interproximal surfaces before light curing.

The Componeer Technique (Indirect Technique)

Componeers are polymerised, prefabricated, nano-hybrid enamel thin shells with different size and shape. The armamentarium used are the shade guide, composite syringe, etchant, one coat bond SL, Componeer placer, filling instrument, polishing rubber cup, composite finishing and polishing bur, disc and strips (Fig 4).

Fig. 4: Armamentarium for Componeers

A Coltene shade guide was used to select the shade under white corrected light and the shape and size of the Componeer shells was determined using the contour guide which had three mold sizes ranging from small, medium and large.

Tooth preparation was carried out with a conservative approach on the labial surface of lower anterior teeth with round end tapered diamond bur. The minimal depth cut of 0.2 mm was prepared with supragingival conservative chamfer finish lines up to 0.3 mm on enamel surface. The prepared tooth surface was polished with oral prophylaxis paste (Pyrax® Prophyl Paste) using a contra angle micromotor at low speed. Acid etching was done with 37% Phosphoric Acid on all the labial surfaces. A mylar strip (Shofu Matrix strips) was used for interdental separation. One coat bond SL was applied on the etched surfaces and air dried, transparent matrices placed interproximally between,33,32,31,41,42,43

regions before light curing for 15 secs. Dentin bonding agent (One Coat Bond) was applied on the inner surface of Componeers and blow dried and composite was applied to each Componeer shell and pressed onto the labial surface with the help of placer instrument, gentle pressure was applied on the preformed shell using a rubber tipped condenser to squeeze out air voids and excess flash was removed. The Componeers were light cured for one cycle of 20 Secs and finished with fine composite finishing and polishing burs and disc.

Step by step process of the componeer system

Post insertion hygiene and maintenance instructions were given with periodic recall visits scheduled post insertion.

Discussion

Discolouration of teeth compromises the smile and esthetics of the patient. There are different variations and types of stains depending on the aetiology, appearance, composition, location, severity and degree of adherence to the tooth.^[8] The classification of tooth discolouration is mainly divided into intrinsic, extrinsic, and internalized.

The extrinsic stains are present on the outer surface of the tooth or in the acquired pellicle.^[9] The prevalence of extrinsic stains increases with age and it was observed that

there is higher predilection in male than female.^[10] As the physiological age increases, teeth become darker and the knowledge of colour plays a vital role in esthetic dentistry. With good knowledge and training the science of colour perception can be visualised and play an important role in restorative dentistry. Extrinsic stains can occur due to occupational hazards to metallic salts and medicine.^[11]

History of the patient is important to understand the etiopathogenesis of stain and discolouration with familial history of metabolic and systemic disorder like alkaptonuria, congenital erythropoietic porphyria, congenital

hyperbilirubinemia, amelogenesis imperfecta, and dentinogenesis imperfecta, tetracycline staining, fluorosis, enamel hypoplasia, pulpal haemorrhage, root resorption and ageing. The thickness and the changes in the structural components of the hard tissues of the teeth leads to intrinsic stains.

There can be internalized stains where the external stains can be incorporated during tooth development. Mc Kay and G.V Black published the effect of fluoride on teeth in 1916. The use of fluoride in prevention and treatment of dental caries with scientific background were founded by two American dentists Dr Fredrick McKay and an US public health officer H. Trendley Dean. The optimum level of water fluoride should be below 0.9-1.0 PPM according to Dean and McKay. In 1937, fluorosis was found in Nellore of Andhra Pradesh by Shortt et al. In India, fluorosis was identified in 1937 in Nellore of Andhra Pradesh by Shortt *et al.* Madurai in Tamil Nadu is known endemic fluorosis zone and the level is 1.5-5.0 ppm. Other places in India are Rewari, Ferozpur in Punjab, Mahendergarh in Hisar, Faridabad in Haryana, Unnao, Rae Barily in Uttar Pradesh, Nalganda district in Andhra Pradesh.

There are different treatment modalities which depends on the severity of the stains like In-office bleaching, micro and macro abrasion, direct and indirect veneers, direct composite, indirect ceramic veneers.

In this case report, the upper teeth were restored with ceramic laminates and in the lower teeth with Componeers. Proper diagnosis and treatment planning is required for management of patient with intrinsic stains. There are direct and indirect techniques of restoration of teeth and the choice of the treatment also depends on the expectations, esthetic demand and the socio-economic background. Individuals with lower income group can opt for composite veneers as it is inexpensive and the esthetics and restorative needs are satisfied. Ceramic laminate veneer has the properties of colour stability and high resistance against abrasion but the drawback is that it is expensive and has long chair side time.

With direct^[12,13] and indirect^[14,15] techniques, it is possible to enhance the smile. With the breakthrough in the new restorative material, the dependence on the laboratory is reduced.

Ceramic laminate veneers are more durable than direct composite veneer with proper case selection, preparation technique, application of luting agent^[16,17] and it is a conservative approach. Ceramic laminate veneers are indicated when minimum tooth surface has to be removed for minor correction/malformations, coronal fracture, diastema closure, missing lateral incisors, fluorosis, tetracycline staining, crown length and width correction, enamel erosion.^[18-20] Ceramic veneers are contraindicated with a history of bruxism, deep bite, severe dental anomaly and periodontal disease where the placement of veneers is compromised. The drawbacks are the high cost and multiple appointments^[21,22] and additional adhesive cement. There are challenges in designing the smile in the anterior region and with the recent advances in componeers, the outcome of success is evident.

With the evolution of ceramic laminates and the advances in the ceramic materials and technique the smile can be enhanced with less tooth preparation. The invention of ceramic laminate veneer in the anterior teeth by Charles Pincus in 1937 and the popularity of this technique was evident in mid-1970 with direct resin composite, custom-made porcelain veneer and prefabricated composite veneers.

Excellent clinical results have been found in veneers with well-trained clinician and highly skilled dental ceramist.^[22,23]

Componeers are thin shells of precured and prefabricated composite laminates and their mechanical strength and surface hardness are lesser than porcelain.

Ceramic veneers are brittle and chances of chipping off is more than componeers although ceramic is superior than Componeer. Ceramic is glossier in appearance as it is polishable and esthetically more superior than componeers. Componeer conserves the tooth reduction on the labial surface with 0.6-1 mm incisal area and 0.3 mm cervical region. Componeer combines the properties of direct and indirect veneers. Ceramic laminates require 2-3 mm of tooth reduction as the thickness of the ceramic is 1 mm. Supragingival, gingival or subgingival cervical margins can be given for ceramic whereas gingival or supragingival cervical margin for Componeer. The butt joint with straight fissure for ceramic cervical margin and chamfer finish line for componeer are preferred.

Conclusion

Good knowledge and technical skills are of paramount importance for the success and failure of veneers. There are different treatment modalities for improvement of smile in the anterior region such as ceramic veneers, metal ceramic restoration, all ceramic crowns and direct composite veneering. A proper diagnosis, clinical examination and technical skills are required in decision making to consider the choice of composite veneer or ceramic veneer. The case selection is the most important parameter for the long-term prognosis of ceramic veneers. Componeer has the advantages of easy, efficient, less chair-side with one appointment, no impression involved, easily repairable in one session, economical and high success and efficiency with good esthetic outcome.

Funding

None.

Conflict of Interest

The authors confirm that this article content has no conflict of interest.

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How to Cite: Devadoss P, Kusum S, Thomas S. Newer trends in esthetics with direct and indirect veneers: A case report. *Global J Dent Specialty.* 2021;1(4):141-146.