

Esthetic Management of Discolored Anterior Teeth by Minimally Invasive Approach of Ceramic Veneers - Case Reports

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Abstract

Ceramics have been used in dentistry and medicine for many years. Currently ceramic restorative materials possess colour stability, mechanical strength, clinical longevity, excellent esthetic appearance, optimal bond strength to tooth substrate, and are compatible with the periodontal tissues. Their properties make these materials suitable for a wide range of clinical applications. The porcelain veneers are considered as an excellent esthetic restorative option for darkened teeth and provide a conservative method of improving appearance or contour with high degree of patient acceptance. The present case reports illustrate the results that can be achieved using porcelain veneers to restore anterior dentition with discoloured and misaligned teeth.

Introduction

Re-establishing a patient's lost natural dental esthetics due to extrinsic and intrinsic discoloration, malalignment is an important aspect of dentistry. Ceramics have been increasingly popular restoration of choice (Magne & Belser) where discoloured teeth are resistant to bleaching such as Fluorosis stains, tetracycline stains, when anterior teeth require major morphologic modifications such as conoid teeth, diastemas and to prolong the incisal edge of the tooth to increase its length.¹ One of the standard care for esthetic smile rehabilitation are ceramic veneers. They comprise a conservative and highly esthetic treatment that also offer high predictability and good clinical performance in the long term.²

Porcelain veneers have traditionally been made from aluminous or reinforced feldspathic porcelains. With technological improvement and the evolution of dental restorative materials, it is currently possible to develop and produce ultrathin veneers with thickness of 0.1-0.3 mm, adhesively cemented on the tooth surface with minimal or no preparation, to modify color, shape, and/or positioning of the teeth.³ The porcelain materials commonly indicated for use as veneers are sintered feldspathic porcelain or hot pressed glass ceramic because of their translucency and potential for use in small thickness. Their variety in tonality from opaque to translucent allows mimicking of natural tooth structure, resulting in satisfactory esthetic results.⁴

The aim of this case series is to describe the rehabilitation of discoloured, malaligned maxillary anterior teeth and the smile line of the patient utilizing ceramic veneers.

Case Report 1

A 24 year female patient reported to the department of conservative dentistry and endodontics, Shree Bankey Bihari Dental College And Research Center wishing to improve the appearance of her discoloured front teeth since childhood. The medical history was non contributory. On intraoral examination, the

teeth had brownish and white patches enveloping them, more prominently seen on maxillary anterior teeth. Incisal edge disfigurement and disharmony in shape was present with respect to maxillary central and lateral incisors. The case was diagnosed as moderate dental fluorosis (Dean's index) and indirect ceramic veneers were planned on maxillary anterior teeth as the patient was not willing to undergo treatment for mandibular anteriors.

Figure 1a: Preoperative facial.



Figure 1b: Preoperative intraoral facial view.



A dental cast was obtained from the diagnostic impressions of the patient for mock

up and preparation of provisional restorations. Tooth preparation for incisal overlap type of porcelain veneers was planned. With the help of three tiered depth cutting bur horizontal grooves of 0.5 mm were prepared on the labial surface of the maxillary anterior teeth. Using this as a guide, labial surface reduction of the teeth was done giving chamfer finish line supra-gingivally. Incisal edges were incorporated in the preparation by reducing 1mm of their length. Proximally, the contacts were broken and palatally, the preparation extended to the incisal third of the teeth. Finally an extrafine, tapered cylindrical bur was used to finish the preparation by rounding of all angles and remove any irregularities from the prepared surface.

Figure 1c: After tooth preparation.



For the impressions, at first the retraction cord was placed into the gingival sulcus and then a double viscosity polyvinyl siloxane impression was taken. After the removal of retraction cord shade selection was done with the help of Vita Classical shade guide as A2. Provisional restorations were given to the patient and the impressions were sent to the lab.

Figure 1d: Upper and lower impressions taken.



Porcelain veneers once received, should be checked for marginal adaptation, alignment, shape and color in the patient's mouth. After removal of the provisional restorations, the teeth are subjected to prophylaxis with pumice and rubber cup. Internal surface of ceramic units were etched with 10% hydrofluoric acid for 1 minute, rinsed with water, followed by application of silane coupling agent and gently air drying the surface.

Figure 1e: Labial surface of Porcelain veneers.



Figure 1f: Palatal surface of Porcelain veneers.



After the isolation of gingiva, the prepared surfaces were etched with 35% phosphoric acid for 30 seconds, rinsed with water and gently dried. Bonding agent was applied on the etched surface and gently dried for 2-5 seconds. Rely X veneer cement (translucent shade) was used to lute the veneers on to the teeth and light cured for 5 seconds. Excess cement was trimmed off the margins using manual instrumentation. Additional light curing was done on the labial and palatal surfaces for 40 seconds. Finishing and polishing of the margins was done with abrasive discs and strips. Occlusal interferences were checked. Final results can be seen in post operative photographs.

Figure 1g: Postoperative intraoral facial view.



Figure 1h: Postoperative facial view.



Case Report 2

A 25 year female patient reported to the department of conservative dentistry and

endodontics with the chief complaint of discoloured and fractured teeth in upper front tooth region. No medical history was reported. On intraoral examination, the teeth had brownish and white patches seen prominently on maxillary central and lateral incisors. Incisal edge disfigurement was present with respect to maxillary central incisors. Dental caries was present on the mesial surfaces of both maxillary central incisors and distal surface of maxillary left central incisor. The case was diagnosed as moderate dental fluorosis (Dean's index). Both maxillary central incisors were vital when tested by electric pulp vitality tester. Indirect ceramic veneers were planned on maxillary central and lateral incisors as the patient was not willing to undergo treatment for maxillary canines.

Figure 2a: Preoperative facial view.



Figure 2b: Intraoral view of maxillary anterior teeth.



The procedure for veneer placement was similar to the first case except that the carious portions were incorporated into the tooth preparation and minimal labial surface reduction was done for maxillary central incisors due to less labial tooth structure present. Final results can be seen post operative photographs.

Figure 2c: Tooth preparation and placement of retraction cord.



Figure 2d: Facial surfaces of porcelain veneers.



Figure 2e: Palatal surfaces of porcelain veneers.



Figure 2f: Intraoral view of maxillary anterior teeth.



Figure 2g: Post operative facial view.



Discussion

Teeth with harmonic appearance and attractive smiles have positive effects on the patient's self-esteem and psychosocial well-being. For this reason, esthetic rehabilitation has become popular.

Indications of whether the porcelain veneers should be used as a conservative solution to an esthetic problem may include the presence of discoloured teeth which are resistant to vital bleaching, displeasing shapes or contours, the need for morphologic modifications, diastema closure, minor tooth alignment, restoration of localized enamel malformations, fluorosis and teeth with minor chipping and fractures.^{5,6}

The coronal portion of the tooth consists of enamel, dentine and pulp. Any change to these structures is likely to cause an alteration in the outward appearance of the tooth caused by its light transmitting and reflecting properties.⁷ Tooth discoloration has been classified according to the location of the stain, which may be either intrinsic or extrinsic. Dental fluorosis is a type of intrinsic stain resulting from chronic endogenous intake of fluorides in amounts exceeding the optimal daily dose of 1 ppm. Dental fluorosis features hypo-mineralization of enamel which occurs due to the effects of excessive fluoride on ameloblasts during amelogenesis.⁸

It is of outmost importance that the case selection, tooth preparation, veneer placement and cementation and patient maintenance are the hallmarks for long clinical success of veneer placement.⁹ There are four types of veneer incisal preparations are possible for veneers: a)

window, b) feather, c) bevel or d) incisal overlap. In incisal overlap design, the incisal edge is reduced and then the veneer preparation extended onto the palatal aspect of the preparation. This also helps to provide a positive seat for luting whilst involving more extensive tooth preparation. The preparation depth should be of the order of 0.4 mm close to the gingival margin, rising to 0.7 mm for the bulk of the preparation.¹⁰

Porcelain veneers gained increasing popularity ever since and said to have high survival rates and good clinical success having excellent biocompatibility with gingival, periodontal tissues and provide precise colour match and translucency to the natural tooth.¹¹ A study conducted by Goldstein and Lancaster showed that patients would readily accept shorter restoration life expectancy (five to eight years) if enamel could be saved by not reducing the tooth for a full crown.¹² There is a general agreement among the practitioners that porcelain veneers will continue to play a vital role in elective dental aesthetics. This places high demands on predictability, especially with colour matching and masking methods. The final shade of the veneers depends not only on the colour, opacity and thickness of the porcelain but also the colour of the underlying tooth and the colour and thickness of the luting composite.¹³

On another hand, not all patients are suitable candidates to ceramic veneers procedure. The high cost of the treatment and occlusal instability are primary limitation to be considered. Due to the thin thickness of the Ceramic veneers, which increases the risks of irreparable fractures, when occlusal forces act, it is important to be careful with patients that presents parafunction.¹⁴ An increased risk of failure is present only when veneers are partially bonded to dentin. The major shortcoming of porcelain veneers was the relatively wide marginal discrepancy. At these marginal openings the luting composite was exposed to the oral environment and the wear resistance of the composite luting agents was not yet optimal. Nevertheless, these shortcomings had no direct impact on the success of porcelain veneers in the medium term. The estimated survival probability of porcelain veneers over a period of 10 years is 91%.¹⁵ The perfect combination of restorative material and cementation strategy will determine the clinical success of a restoration. An adhesive cementation technique is fundamental to retain the veneers, given that they lack preparation for mechanical retention.¹⁶

The cases presented herein have replicated the treatment outcomes through the use of esthetic and restorative techniques. The benefits include correction of tooth shapes and dimensions that result in improved tooth proportions with an esthetically pleasing appearance.

Conclusion

Porcelain veneers are a useful adjunct to the dentist for management of esthetic problems in both young and old patients. Clinician should be careful during tooth preparation and luting phase so that optimal results can be ensured.

Ceramic veneers displayed promising results when considering the esthetic and mechanic criterias. The new smile of the patient was satisfactory with excellent esthetic appearance.

References

- Garbaer D. Traditional tooth preparation of porcelain laminate veneers. *Comp Cont Ed Dent* 1991;12:316-322.
- Peumans M, Meerbeek BV, Lambrechts P, & Vanherke G Porcelain veneers: A review of the literature *Journal of Dentistry* 2000; 28(3): 163-177.
- Strassler HE Minimally invasive porcelain veneers: Indications for a conservative esthetic dentistry treatment modality *General Dentistry* 2007; 55(7): 686-694.
- Carpena G, Ballarin A, & Aguiar JA New ceramics approach for contact lens Odovtos *International Journal of Dental Sciences* 2015; 17(1): 12-18.
- Albanasi, R. B.; Pigozzo, M. N.; Sesma, N.; Lagana, D. C.; Morimoto, S. Incisal coverage or not in ceramic laminate veneers: A systematic review and meta-analysis. *J Dent, Bristol* 2016; 52: 1-7.
- Dietschi, D. Optimising aesthetics and facilitating clinical application of free-hand bonding using the 'natural layering concept'. *Br Dent J, Riberão Preto* 2008; 204, 4, 181-185.
- Watts, Am, Addy M. Tooth discolouration and staining: a review of the literature. *Br. Dent J.* 2001; 190(6): 309.
- DenBesten, Pamela, Wu Li. *Chronic fluoride toxicity: dental fluorosis. Fluoride and the Oral Environment.* Karger Publishers, 2011; 22: 81-96.
- Garber DA, Goldstein RE, Feinman RA. *Porcelain laminate veneers*, Lombourg: Quintessence Publishing Co, 1987.
- Walls AWG, Steele JG, Wassell RW. Crowns and other extra-coronal restorations: porcelain laminate veneers. *Br Dent J.* 2002; 193(2): 73.
- Shetty, Ashish. Survival rates of porcelain laminate restoration based on different incisal preparation designs: an analysis. *J Conserv Dent.* 2011; 14(1): 10.
- Ahmed T. Porcelain laminate veneers—a review. *Journal of Evolution of Medical and Dental Sciences.* 2013; 2(45): 8856-8859.
- Davis BK, Aquilino SA, Lund PS, et al. Subjective evaluation of the effect of porcelain opacity on the resultant color of porcelain veneers. *International Journal of Prosthodontics* 1990; 3: 567–72.
- Farias-Neto A, Gomes EM, Sánchez-Ayala A, Sánchez-Ayala A, Vilanova LS. Esthetic rehabilitation of the smile with no-prep porcelain laminates and partial veneers. *Case reports in dentistry*, 2015.
- Miyashita E, Fonesca AS. *Odontologia estética: o estado da arte.* São Paulo: Artes Médicas; São Paulo, 2004.
- Beier, U. S.; Kapferer, I.; Dumfahrt, H. Clinical long-term evaluation and failure characteristics of 1,335 all-ceramic restorations. *Int J Prosthodont, Chicago* 2012; 25(1): 70-78.
- Ge C, Green CC, Sederstrom D, McLaren EA, White SN. Effect of porcelain and enamel thickness on porcelain veneer failure loads in vitro. *J Prosthet Dent* 2014; 111: 380-7.
- Cunha LF, Pedroche LO, Gonzaga CC, Furuse AY. Esthetic, occlusal, and periodontal rehabilitation of anterior teeth with minimum thickness porcelain laminate veneers. *J Prosthet Dent* 2014; 112: 1315-1318.
- Javaheri D. Considerations for planning esthetic treatment with veneer involving no or minimal preparation. *J Am Dent Assoc* 2007; 138(3): 331–37.
- Magne P, Hanna J, Magne M. The case for moderate, guided prep indirect porcelain veneers in the anterior dentition. The pendulum of porcelain veneer preparations: from almost no-prep to over-prep to no-prep. *European Journal of Esthetic Dentistry.* 2013; 8(3): 376-388.
- Layton DM, Walton TR. The up to 21-year clinical outcome and survival of feldspathic porcelain veneers: accounting for clustering. *The International journal of prosthodontics.* 2012; 25(6): 604-612.
- Fons-Font A, Sola-Ruiz MF, Granell-Ruiz M, et al. Choice of ceramic for use in treatments with porcelain laminate veneers. *Med Oral Patol Oral Cir Bucal* 2006; 11(3): 297–302.
- Christensen GJ. What is a veneer? Resolving the confusion. *J Am Dent Assoc.* 2004; 135(11): 1574–6.
- Paris S, & Meyer-Lueckel H Masking of labial enamel white spot lesions by resin infiltration—a clinical report *Quintessence International* 2009; 40(9): 713-718.