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IP Indian Journal of Conservative and Endodontics

Journal homepage: www.ipinnovative.com

Case Report

Enhancing smile with ceramic veneers two case reports

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ARTICLE INFO

Article history:
Received 19-05-2020
Accepted 28-05-2020
Available online 07-09-2020

Keywords:
Diastema
Esthetics
Porcelain
Smile
Veneer

ABSTRACT

Aesthetic rehabilitation depends clinical procedures as well as respect for biomemitic principles to obtain the final result. In this case report, two cases are described for the restoration of anterior teeth with porcelain veneers. The porcelain veneers have become a treatment of choice due to the advancements in its bonding procedures as well as its high esthetics. The clinical success of any technique depends on the correct identification of a case for which this treatment is appropriate and the successful execution of the clinical steps involved.

1. Introduction

The term aesthetics comes from the Greek word "aisthetike" and was coined by the philosopher Alexander Gottlieb Baumgarten in 1735 to mean "the science of how things are known via the senses." Esthetic (cosmetic) dentistry can be defined as the art and science of dentistry applied to create or enhance beauty of an individual within functional and physiological limits.

For malformed, malpositioned, or slightly damaged teeth, adhesively bonded direct and indirect dental materials can restore aesthetics and create a pleasing smile with minimal invasiveness and limited sacrifice of natural tooth structure.

Resin composites are routinely used to mask tooth discolourations and recontour tooth. However, resin composites are susceptible to staining and discoloration, wear and marginal fractures, which reduces the aesthetic result in the long term.[1] When composite resin is polymerized in the laboratory by light, heat, or other methods, the shrinkage occurs before the restoration is bonded into place, thus only a thin layer of luting composite resin is subject to shrinkage at the tooth-restoration interface. This results in less marginal gap, which reduces the likelihood of marginal leakage, sensitivity, recurrent decay, and staining. In addition, they produce a greater degree of polymerization than that achieved with light alone. Thus the physical properties of tensile strength and hardness may be improved, providing for longer lasting and stronger restorations.[2]

Charles Pincus 5 introduced porcelain veneers in 1938 to provide temporary aesthetic improvement to patients in the film industry. Porcelain veneers have excellent esthetics, are durable and have exceptional marginal integrity, high soft tissue compatibility and because of their ability to conserve more tooth structure than porcelain-fused-to-metal and all-porcelain full coverage restorations.

Laminate veneers came as a good alternative when full veneer crowns were cemented to the teeth after extensive preparation, which put the tooth vitality into jeopardy. 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 thicknesses.[3–5] Their variety in tonality from

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https://doi.org/10.18231/j.ijce.2020.032

opaque to translucent allows mimicking of the natural tooth structure, resulting in satisfactory esthetic results.[6]

According to Manuele Mancini, ceramic veneers can be offered as the treatment option in a wide variety of different cases such as:

1. Abrasion;
2. Coronal fracture;
3. Correcting tooth defects (e.g. the closure of interdental spacing and restoration of malformed teeth where crowns are not indicated);
4. Diastema;
5. Orthodontics (e.g. discrepancies in the size and shape of teeth that are not correctable by orthodontics alone);
6. Tooth discoloration (especially for treatment of discoloured teeth that do not respond to tooth whitening or micro-abrasion procedures);
7. To adjust occlusion (e.g. realignment of in-standing, rotated or protruding teeth).

Long term survival rates of ceramic veneers are higher than both direct and indirect composite resin veneers.[7,8]Therefore, the case series presents an esthetic approach to reestablishing the esthetics and balance of the smile with ceramic veneers as the restorative strategy.

2. Case Reports

A female patient aged 21 years reported with chief complaints of spacing between teeth in the upper front teeth region.

In case 2, a 22 years old male patient presented with a chief complaint of spacing in the upper front teeth region leading to an unpleasant smile.

A complete intraoral and extraoral examination was performed that included evaluation of the hard and soft tissues, temporomandibular joints, periodontal health, occlusion, and condition of existing dental restorations. The medical history for both the patients was non-contributory. Appropriate initial full face and close up photographs in front and side profile were taken to complete the evaluation and support the treatment plan (Figure 1).

Both the tooth component (dental midline, incisal lengths, tooth dimensions, zenith points, axial inclinations, interdental contact area (ICA) and point (ICP), incisal embrasure and symmetry and balance) and soft tissue components (gingival health, gingival levels and harmony, interdental embrasure and smile line) were examined and any discrepancy was noted.

Clinical examination revealed there was diastema between 12,11,21,22 with class I occlusion for both the patients (Figures 2 and 11 a).

The dental midline was shifted to the right for patient 1, 22 was a peg lateral and the gingival zenith was not in an ideal position in the second quadrant with 21,22 and 23 having the gingival zenith in the same line. (Figure 3c)

Two sets of diagnostic models of both maxillary and mandibular arches were obtained by using the double impression technique with polyvinyl siloxane material and special type IV die stone.

The treatment planning began with a diagnostic wax up (Figure 4). In patient 1, the zenith line was not visible during the smile as the patient had a low smile line and thus it was not changed.

A PVS template was made of the diagnostic wax up and used to transfer the wax up to the patients mouth. The template was loaded with bis-acrylic resin and seated in the mouth for five minutes. The template was taken out and the excess material was carefully removed with a scalpel. Photographs were taken. (Figure 5)

The patients were provided with options of direct composite build up, indirect composite veneers and porcelain veneers. The patients opted for porcelain veneers.

Once the desired esthetics and functional outcome had been verified with the mock up, the clinical procedure based upon the treatment plan - a minimally invasive approach with porcelain laminate veneers for teeth 12,11,21,22 began.

Fig. 1: Preoperative - Close up photographs in front and side profile

Fig. 2: Preoperative - Clinical Examination revealing diastema between 22,21,11,12

3. Treatment procedure

Signed informed consent was taken from each patient and oral prophylaxis was carried out.

Before proceeding for tooth preparation, shade was selected using Vitapan Classical shade guide (Vita Zahnfabrik, Germany). The maxillary teeth were then prepared from right lateral incisor to the left lateral incisor to receive porcelain laminate veneers. Three horizontal surface

Fig. 3: Preoperative - Discrepancy in gingival zenith and the peg lateral

Fig. 4: Diagnostic wax up

Fig. 5: Mock up

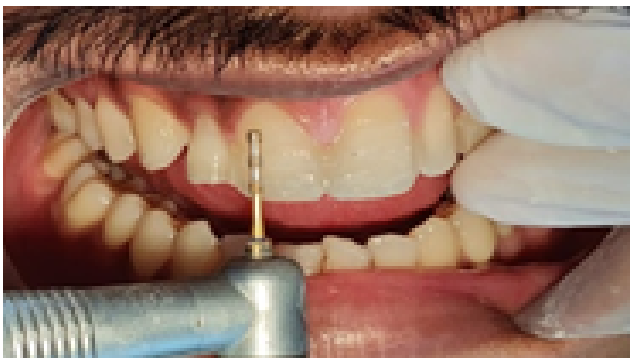

Fig. 6: Tooth Preparation– Depth guides

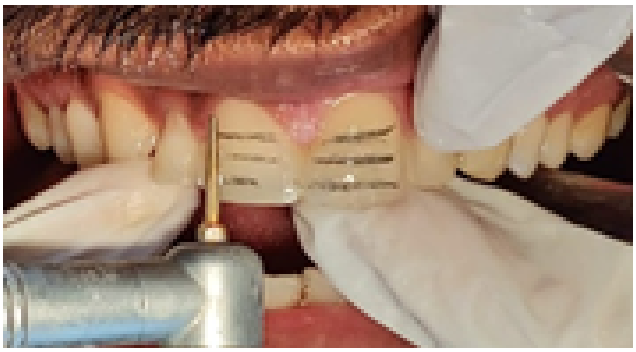

Fig. 7: Tooth Preparation – Labial Reduction

Fig. 8: Gingival retraction cord placement

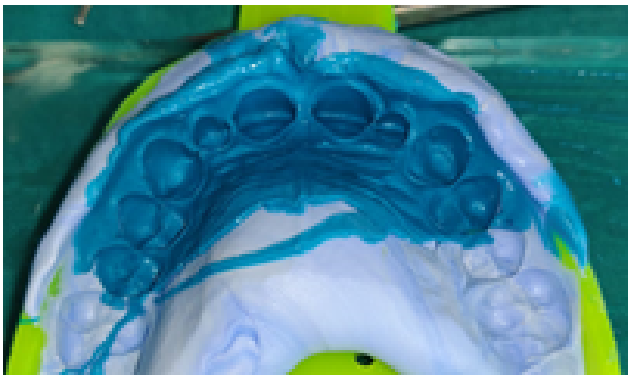

Fig. 9: Full arch impression using poly vinyl siloxane material

depth cuts were prepared in the labial surface with a friction grip three-tiered depth cutting diamond. (Figure 6). Depth cuts were kept in enamel at a depth of 0.5mm. Three incisal depth cuts were prepared with the same bur creating a preparation that was 1 mm short than the desired final restoration. The labial reduction was done in two planes using a tapered diamond point with rounded tip (Figure 7). The proximal margins were extended into the area of the contact point to make it invisible and a 0.5- mm-deep chamfer finish line was prepared throughout the preparation using the same round end tapered bur. The incisal edge

Fig. 10: Post operative – after luting the veneer for 22,21,11,12

Fig. 11: a-c

was reduced by 1mm so that the bulk of ceramic can be placed to reduce chances of fracture as stated by Dr. Vimal Sikri. Three depth cuts were prepared on the incisal edge using the same bur followed by reduction. The incisopalatal finishing line was prepared to a modified butt joint with the diamond wheel bur. The labioincisolingual angle was kept at an approximate 75 degrees. The labial–incisal angle was rounded, while the lingual–incisal finishing line was kept as a sharp butt joint. All the internal line angles were rounded to reduce stresses in the margins of the veneer. Retraction cord (No.000) dipped in 2% lignocaine and 1:80,000 adrenaline was inserted in the facial gingival sulcus using a cord packer and kept for 5 minutes. (Figure 8). Gingival retraction cord was removed just before the impression making. Full arch impression was made using poly vinyl siloxane material using putty reline technique (Figure 9). An impression of the opposing arch was made using irreversible hydrocolloid material and was sent to the laboratory for fabrication of IPS- emax porcelain veneers. Provisional restoration was not required in both the cases as the tooth preparation was minimal and restricted to enamel.

3.1. Veneer try- in and cementation

The teeth were cleaned with pumice and a prophylaxis brush prior to the trial. The shade, fit, marginal adaptation, shape, size, symmetry of the veneer was assessed. After individual evaluation, collective try-in was done to appreciate the esthetic enhancement. Patient's approval was obtained at the time of try-in.

Prior to cementation, the teeth were isolated using cotton rolls and saliva ejector. The intaglio surface of each porcelain veneer was etched with 4% hydrofluoric acid and silanised by the laboratory. Beauti CEM SA (Shofu) self-etch resin cement (Clear shade C) was used for luting the veneers to the tooth surface. LED light curing was done for 5 secs at first to remove all the gross excess followed by 20 seconds curing for each tooth as recommended by the manufacturer. (Figures 10 and 11 b) Since the veneers were fabricated in the laboratory, additional steps for finishing and polishing were not required.

The patients were given oral hygiene and home care instructions for the adequate care of the porcelain veneers. A strict follow up protocol of 1 week, 3 months and 6 months was done to assess the quality of the restorations. The parameters that were assessed were, marginal discolouration, marginal gaps, surface alterations such as cracks or fracture, surface discolouration.

4. Discussion

Diastema closure is one of the most common and challenging tasks in restorative dentistry. Anterior diastema is defined as "anterior midline spacing greater than 0.5 mm between the proximal surface of adjacent anterior teeth".

Diastema is attributed to several etiological factors such as supernumerary teeth, abnormal frenum attachment, habits such as thumb sucking and nail biting and other genetic and physiological factors.

Proper examination and patient selection are crucial for treatment planning.

The different treatment options for diastema closure are orthodontic approach, restorations using direct composite resin, indirect composite resins, ceramic veneers. In the present case series, the treatment options were carefully explained to the patient, including the advantages and limitations of each technique. In both the cases presented, indirect ceramic veneers were selected by the patient. Study cast models and diagnostic wax-up that were prepared were useful to evaluate the anatomical features, occlusion and also to visualize the esthetic result.

Clinical success of this treatment depends on case selection. Indications of whether veneers should be used includes: diastema closure, restoration of localized enamel defects, discolored teeth resistant to vital bleaching procedures, the need for morphologic modifications, minor tooth alignment, mild to moderate fluorosis, fractured teeth.[8] The contraindications are: edge to edge bite, deep bite, bruxism and other parafunctional habits.[9]

An overall chamfer preparation was done to reduce the risk for fracture and also to facilitate work and colour build

up along with cementation of the veneer.

Under the perspective of adhesion, a self-etch adhesive system without prior acid etcing the enamel surface was used in the cases. Miguez et al. suggested supplementary etching for self etch adhesive resin cements for restorations that rely mainly on enamel bonding. Peumans et al. found that acid-etching enamel had no effect on the restoration retention. In addition, in the clinical cases here reported, the entire adhesion area was located in enamel without dentin exposition; the long-term results may be more favorable without etching. [10,11]

In the present case series, veneers were made with lithium disilicate based ceramic. These ceramics provide excellent esthetics and have high translucency, thereby mimicking natural dentistion. [12] They have low mechanical properties but are highly esthetic, thus they are appropriate for minimal prep or no prep veneers. For effective bonding between veneer and substrate, there must be minimum 50% of enamel as the substrate. [13,14] The bonding between the tooth and the veneer plays a crucial role in the success of the treatment. [15]

In the case series, all three patients were pleased with the treatment procedure and there was no degradation of the restoration quality on fo llow up where marginal discolouration, marginal gaps, surface alterations such as cracks or fracture, surface discolouration were assessed.

5. Conclusion

In the present case reports, reproduction of lifelike appearance of natural teeth could be achieved an the patients were satisfied with the outcome. Advantages of ceramic venners such as minimal tooth preparation and bonding of ceramic to tooth structure enhance the treatment quality.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Cite this article: Jajoo N, Chowdhury D, Maity I, Majumdar TK. **Enhancing smile with ceramic veneers two case reports**. *IP Indian J Conserv Endod* 2020;5(3):135-139.