

## Miles Towards The Smile: A Case Series

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**Abstract:** A smile reflects a person's inner self and uniqueness, in harmony with the lips and enhances the beauty of the person's character. The dentist's perception, talent, artistic flare and skills in listening to the specific desires of his patient, help to create a smile that suits the face and personality of each individual patient. Evolution of laminates and veneers over the last several decades has become esthetic dentistry's most popular restorations. It is a conservative alternative to full coverage for improving the appearance of an anterior tooth as it makes possible to preserve as much tooth structure as is feasible while satisfying the patient's restorative needs and desires. With indirect restorations, clinicians should choose a material and technique that allows the most conservative treatment, which meets the aesthetic, and biological requirements of the patient and which has the mechanical requirements to provide clinical durability.

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### I. Introduction

With the evolution of new techniques and adhesive systems, minimum thickness porcelain laminates are useful in conservative treatment option. They are used when there is adequate sound tooth structure present and is indicated in cases of discoloration, midline diastema, fractured tooth, malposed teeth, etc. In such cases, the tooth is vital and adequate enamel structure is present for tooth preparation. 0.3 mm and 0.5 mm reduction is adequate on enamel surface, and with this 95% of enamel, preservation is possible without exposure of dentin. Hence, use of laminated veneers is strongly indicated to restore or even promote the harmony of the smile. <sup>(1)</sup> Zirconium dioxide now a days is used to fabricate prosthodontic restorations such as single crowns, bridges, veneers, onlays, inlays, endodontic posts as well as zirconia abutment for implants. The material has minimal distortion during firing with no or less plaque accumulation. Along with esthetic restoration the material shows advantages of abrasion resistance, color stability, translucency and excellent tissue response. <sup>(2)</sup> The clinical success of the technique can be attributed to great attention to detail in a set of procedures, which include treatment planning, conservative preparation of the teeth, proper selection of ceramics to use, proper selection of the materials and methods of cementation and proper planning of maintenance of this restorations. In the following case, zirconia was the best suited to mask the discoloration for a long time period and also to maintain the internal strength and vitality of the teeth. The clinical success of the technique can be attributed to great attention to detail in a set of procedures, which include treatment planning, conservative preparation of the teeth, proper selection of ceramics to use, proper selection of the materials and methods of cementation and proper planning of maintenance of this restorations.

### II. Case Report

#### Case report 1:

A 27-year-old male patient reported in the department of prosthodontics with the chief complaint of spacing between upper and lower front teeth and bad appearance due to discoloration of lower front teeth. Detail medical and dental history was obtained. On extraoral examination, no abnormal findings were seen. Intraoral examination revealed spacing between the maxillary left canine to maxillary right canine (13 12 11 21 22 23) and grayish discoloration of mandibular anteriors (33 32 31 41 42 43) (fig 1b). Radiograph of mandibular anteriors showed minimal thickness of enamel. Various treatment options available were full coverage zirconia or porcelain-fused-to-metal crowns, composite veneers, and porcelain veneers. As full crown requires more tooth

reduction, it was eliminated. Composite veneers are not much durable and possess poor colour stability it was also eliminated. Due to the least invasive nature and brilliant esthetic qualities of laminates, it was decided to use porcelain laminate veneers in maxillary anteriors for enhancing patients smile. As radiograph depicted minimal enamel thickness in the mandibular anteriors, it was decided to go for full coverage zirconia crowns in order to avoid chances of bond failure of the laminates.

### Procedure

1. Diagnostic impressions of maxillary and mandibular arches were made using alginate impression material (Dentsply Vignette Chromatic Alginate), and casts were poured (Type II gypsum).
2. The cast was mounted on a semi-adjustable articulator with facebow transfer and interocclusal record. Mockup was done of the maxillary and mandibular anteriors for laminates and full coverage crowns respectively.(fig 1c)
3. 0.3 mm–0.5 mm depth orientation grooves were made on the facial and incisal surfaces of the tooth with wheel diamond depth cutter, respectively, on 11,12,13,21,22 and 23 . The depth grooves were connected with each other, and tooth structure in between was removed with a round end tapered diamond. Incisal edge was reduces 0.5 mm and preparation was extended palatally to enhance esthetics. Subgingival deep chamfer finish line was placed in the maxillary anterior teeth. Retraction cord was placed for gingival retraction (Medi-Pak 000 knitted non-impregnated India) . Final impression was made with elastomeric impression material (Silagum DMG Germany), (fig 3a, 3b) and master casts were poured (type IV gypsum).
4. Provisionals were cemented (Luxatemp Ultra DMG Germany) (fig 4a)
5. the mandibular anterior teeth were prepared for full coverage zirconia crowns.
6. Tooth preparation was done for the mandibular anteriors. 2mm of reduction on incisal and around 1-1.5mm reduction of buccal, lingual and proximal surfaces. Subgingival long and deep chamfer finish line of around 1mm was prepared with round end taper bur followed by gingival retraction using 000 retraction cord (Medi-Pak000 knitted non-impregnated India).
7. Final impressions were made with elastomeric impression material (Silagum DMG Germany), and master casts were poured (type IV gypsum).
8. Appropriate shade selection was done .
9. Provisionals were cemented on the mandibular anterior teeth followed by verification of phonetics.(fig 4a)
10. Wax trial were checked and verified with respect to fit and contour in maxillary and mandibular anterior teeth.(fig 4b)
11. IPS-e.max porcelain veneers for maxillary anterior teeth and full coverage zirconia crowns were fabricated after casting procedure. Try in was done to check for shade, shape, and fit of veneers.
12. Internal surface of porcelain veneer crowns were etched with 9.5% hydrofluoric acid (Angelus Brasil etching gel) for 20 s [Figure 3b]. After rinsing with water and drying with air a layer of silane coupling agent (3M ESPE Rely XTM) was coated on the internal surface of veneer and was allowed to dry for 1 min. The layer was then light-cured. (fig 5a,5b)
13. Tooth surface was etched with 37% phosphoric acid and dentin bonding agent was applied after rinsing and drying the tooth surface. Coated tooth surface was light cured.
14. Laminates were cemented on maxillary anterior teeth and cured with LED curing unit for 20 s At the same appointment the zirconia crowns fabricated for mandibular anteriors were cemented with Resin cement (Kerr maxcem elite). Esthetics and phonetics was checked in the patient .(fig 6)
15. Patient was given post-operative instructions.



**Fig 1a:** Extraoral profile photograph

Fig 1b: Intraoral photograph showing spacing in maxillary anteriors and discoloured mandibular anteriors. Fig 1c: Wax mockup of maxillary and mandibular anteriors.



**fig 2a-** Tooth preparation of maxillary and mandibular anteriors for laminates and full coverage crowns respectively.



**Fig 3a and 3b-** Maxillary and mandibular final impressions.



**Fig 4a:** Provisionals cemented  
**Fig 4b:** Wax trials checked and verified



**Fig 5a:** Laminates etched with 9% hydrofluoric acid.



**Fig 5b:** Full coverage zirconia crowns for mandibular anteriors.



**Fig 6-** Postoperative photograph after cementation

**Case 2:**

A 28-year-old female patient reported in the department of prosthodontics with the chief complaint of spacing and missing teeth in the upper front teeth region. On extraoral examination, no abnormal findings were seen. Intraoral examination revealed spacing between the maxillary left and right central incisor and missing maxillary left canine. On explaining all the possible treatment modalities to the patient porcelain laminate veneers were planned for 11 and 21 and three unit full ceramic prosthesis for replacing maxillary left canine was selected.(fig 2a)

**Procedure:**

1. Diagnostic casts were mounted.
2. The casts were mounted on a semi-adjustable articulator with facebow transfer with interocclusal record. Mockup was done and verified to avoid any esthetic concerns further.
3. Tooth preparation was done for full coverage zirconia prosthesis for 22,23 and 24 and laminates for 11 and 21 similar to that of case report 1.
4. Bisque trials were verified.
5. Same procedure was carried out for cementation as explained in case report 1.(fig 2b)



**Fig 2a:** pre-operative photograph.



**Fig 2b:** post-operative photograph.

**Case 3:**

A 22-year-old female patient reported in the department of prosthodontics with the chief complaint of spacing and missing teeth in the upper front teeth region. On extraoral examination, no abnormal findings were seen. Intraoral examination revealed spacing between the maxillary left and right central incisor and missing maxillary left lateral incisor. On explaining all the possible treatment modalities to the patient porcelain laminate veneers were planned for 11 and 21 and cantilever type of fixed partial denture for replacing missing left maxillary lateral incisor was selected.(fig 3a)

**Procedure:**

1. Diagnostic casts were mounted.
2. The casts were mounted on a semi-adjustable articulator with facebow transfer with interocclusal record. Mockup was done and verified to avoid any esthetic concerns further. Tooth preparation was done for laminates for 11 and 21 and the maxillary left canine was prepared to receive full coverage zirconia crown to replace lateral incisor without taking any support from anterior abutment.
3. Final impression was made with elastomeric impression material (Silagum, DMG Germany).
4. Bisque trials were verified.
5. Same procedure was carried out for cementation as explained in case report 1.(fig 3b)



**Fig 3a:** pre-operative photograph



**Fig 3b:** post-operative photograph.

### III. Discussion

As being less invasive, for both hard and soft tissues and granting satisfactory aesthetic outcome, the rehabilitation procedure with porcelain veneers has been widely accepted by the patients. It avoids the use of any metal structures and there by possesses excellent esthetic quality. It is also the most conservative restoration, which preserves a significant proportion of the natural enamel. Laminates are indicated in cases with discolored teeth which cannot be treated with bleaching procedures, unpleasant shapes of teeth, midline diastema, teeth in need for morphologic modifications, misaligned teeth, enamel malformations, fluorosis, tetracycline stains, and fractured teeth.<sup>(3)</sup> Contraindications for laminates can be in Patients exhibiting tooth wear as a result of bruxism, short teeth, teeth with insufficient or inadequate enamel for sufficient retention (e.g., severe abrasion), existing large restorations or endodontically treated teeth with little remaining tooth structure, deep bite cases and Patients with oral habits causing excessive stress on the restoration (e.g. nail biting, pencil biting) etc.

Patient's demand for the esthetics are increasing day by day especially for the maxillary anteriors full coverage zirconia crowns are suitable solution in case of discoloration and subgingival tooth decay. These restorations combine the mechanical strength of all ceramic crowns and the esthetic performance of veneers with minimal preparation at the cervical areas. Zirconia crowns ensure optimum esthetic result with increased strength on the cervical areas. It produces consistent quality and superior marginal fit.<sup>(4)</sup> Along with esthetic restoration the material shows advantages of abrasion resistance, color stability, translucency and excellent tissue response. Bleaching or microabrasion of intrinsic stained teeth often gives transient results. In the current case, zirconia was the best suited to mask the discoloured teeth and also to maintain the internal strength and vitality of the teeth.

Cantilever prosthesis may inadvertently contribute to the initiation and progression of periodontal destruction as it is certain that risk is present with a cantilever design.<sup>(5)</sup> The use of cantilever fixed partial denture has been successful in the past<sup>(6,7)</sup>. The determining factor for success of such prosthesis is occlusion. The determining factor for success of such prosthesis is occlusion.

Minimal functional contact<sup>(8)</sup>, reducing the occlusal table<sup>(9)</sup>, and different design considerations have been emphasized<sup>(10)</sup> need to be considered to establish the harmonious occlusion. In the present case, there was minimum change in the position and the inclination of the cantilever pontic which more or less eliminates horizontal occlusal forces in the eccentric movement of the mandible. When patients with such a situation come for rehabilitation with a fixed partial denture, factors of occlusion which would place detrimental forces on the cantilever prosthesis. Evaluation of occlusion at the time of diagnostic mounting and mockup can help us in designing of the prosthesis with respect to the position and the occlusion.

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