

## Porcelain Laminate Veneer, An Esthetic Solution: A Case Series

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### **Abstract:**

Porcelain laminate veneers have emerged as a popular choice in cosmetic dentistry, offering a blend of aesthetic appeal and functional durability. This case series presents two distinct clinical scenarios where porcelain laminate veneers were employed to address aesthetic concerns and restore dental integrity.

Case 1: A 32-year-old female presented with chipped front teeth, affecting her smile aesthetics. Following a comprehensive diagnostic process, including history, examination, and shade selection, the patient underwent the placement of three porcelain laminate veneers and direct composite veneers for additional teeth. The treatment involved meticulous tooth preparation, provisional restorations, and final cementation, resulting in improved aesthetics and patient satisfaction.

Case 2: A 24-year-old patient with a missing front tooth and fluorosis-induced discoloration sought aesthetic restoration. After considering various treatment options, the patient opted for porcelain laminate veneers and a fixed partial denture. The treatment plan involved tooth preparation, impression-making, try-in, and bonding procedures, ultimately delivering aesthetically pleasing and functional outcomes.

Both cases exemplify the versatility and efficacy of porcelain laminate veneers in addressing diverse aesthetic concerns while preserving tooth structure and enhancing patient confidence. The detailed treatment protocols, including shade selection, tooth preparation techniques, and bonding procedures, contribute valuable insights for clinicians seeking to achieve optimal outcomes in cosmetic dental procedures.

This case series underscores the significance of a comprehensive approach to treatment planning, patient communication, and meticulous execution in achieving successful outcomes with porcelain laminate veneers.

### **Background**

Porcelain laminate veneers have indeed become a popular choice in cosmetic dentistry due to their advantageous mechanical and chemical properties. These veneers offer durability and predictability in achieving desired aesthetic outcomes, making them sought-after by individuals seeking to enhance both the appearance and health of their teeth.

**Keywords:** Porcelain laminate veneer, laminate bonding, bonding, emax,

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Porcelain laminate veneers offer a range of desirable properties that make them appealing to both dental practitioners and patients alike:

1. **Excellent Esthetics:** Porcelain veneers are highly customizable, allowing for the replication of natural tooth appearance in terms of color, translucency, and shape. This enables the creation of a beautiful, natural-looking smile. Due to its crystalline structure, it resembles the optical refractive properties of those of translucent enamel.
2. **Good Strength:** Porcelain veneers are durable and can withstand the forces of everyday chewing and biting when properly cared for. This durability contributes to their longevity as a dental restoration option.

3. Ability to Bond with the Tooth: Porcelain laminate veneers bond securely to the tooth surface, providing stability and longevity to the restoration. This bonding also helps to protect the underlying tooth structure and laminate veneers as well.
4. Conservative Option: Compared to other dental treatments, porcelain veneers require minimal removal of tooth structure, making them a conservative choice. This preservation of natural tooth material is advantageous for maintaining dental health in the long term.
5. Colour stability Porcelain veneers exhibit excellent color stability over time, meaning they resist staining and maintain their original shade well. This ensures that the aesthetic appearance of the veneers remains consistent over the long term, contributing to patient satisfaction.<sup>1</sup>
6. Excellent Biocompatibility: highly polished porcelain has amazing tissue response as it has lower tendency for plaque accumulation or even deter plaque accumulation. <sup>2</sup>
7. Tensile bond strength: The bond strength of porcelain with etched enamel(2600-3200psi) is far superior than the composite resin veneers(900-1400psi). <sup>3</sup>

Overall, the combination of excellent esthetics, strength, bonding ability, and conservative nature makes porcelain laminate veneers a popular choice for enhancing smiles and improving dental health.

## II. Case report

### Case 1:

A 32 year old female patient reported to the department of prosthodontics, people's college of dental sciences and research centre, Bhopal; with the complain of poor appearance due to chipped front teeth since 5 years.

#### **Diagnosis and treatment planning**

A comprehensive and systematic approach was taken in planning and executing the treatment with laminate veneers. Here's a breakdown of the steps:

**Case History and Examination:** A detailed case history was obtained, including the patient's chief complaint, medical history, dental history, and any relevant lifestyle factors. This was followed by a thorough examination of the patient's oral cavity to assess their dental condition.

**Diagnostic Impressions and Photography:** Diagnostic impressions were taken to create models of the patient's teeth, aiding in treatment planning and fabrication of the veneers. Intraoral and extraoral photographs were also captured to document the patient's current dental condition and aid in treatment planning.



Figure 1: Preoperative intraoral photograph



Figure 2: Diagnostic models

**Provisional Diagnosis:** Based on the examination findings, a provisional diagnosis of generalized attrition and abrasion was made. This likely informed the treatment plan and choice of restorative option.

**Dentofacial Analysis:** A comprehensive analysis of the patient's dentofacial features was performed to evaluate aspects such as smile line, tooth proportions, symmetry, and facial esthetics. This analysis helped determine the appropriate treatment approach and the number of units of laminate veneers needed.

**Wax Mock-Up:** A wax mock-up of the planned veneers was created to allow the patient to visualize the expected outcome and provide feedback before the final restorations were fabricated. This step is crucial in ensuring patient satisfaction and communication between the clinician and the patient.



Figure 3: Wax mock up

#### **Shade selection :**

The process of shade selection begins with the evaluation of patient's demand and evaluation of patient's mindset.

Considerations for shade selection:

1. Patient Expectations: Shade selection should align with the patient's expectations and desires for their dental restoration.
2. Light Source: Natural, monochromatic light is preferred for accurate shade matching. Additionally, verification of shade under various lighting conditions encountered in daily life is recommended.
3. Ambient Colors: Patients should avoid brightly colored lipsticks, clothes, and reflective jewelry, while operators should steer clear of lurid surgical gowns and drapes to prevent color reflection influencing shade perception.
4. Teeth Whitening: Any desired teeth whitening should be completed before shade selection for new restorations. Additionally, shade selection should occur after one month to allow for stable tooth color.<sup>4</sup>
5. Shade should be selected while the tooth is wet and unprepared.
6. Generally , the teeth should never be whiter than the whites of the eye, as it makes the restoration look artificial.
7. In no condition should the shade of any tooth be of higher value than central incisor
8. Take "chromatic break" by gazing at 18% neutral density grey card to avoid colour fatigue. Gazing at blue card is also suggested to remove the chromatic fatigue but it was found that it causes fatigue of cones for blue colour and increase sensitivitiy for yellow/orange colour again leading to inaccuracies. <sup>5</sup>
9. Shade tab should not be compared for more than 5s , as it may lead to "chromatic adaptation" and may cause colour afterimages.

10. Avoid using curing light before shade selection.<sup>3</sup>
11. Ideally the shade guide should be similar in both the operatory and the laboratory. There are various charts that can be used to convert the shades among various shade guides
12. Two shade tabs, one of the desired shade and one directly above or below in value, should be held directly beneath the teeth to be matched and photographed.
13. If the tooth is discolored or patient demands a shade that is “whiter” than his original shade then recording stump shade is crucial.<sup>6</sup>
14. Shade/color sketching: A set of colored pencils or fine-line markers can be very helpful in sketching the color zones and variations in translucency. Such sketches do not have to be artistic renderings but should adequately define areas of transition between shades, relative translucency and transparency, and characterizing color.
15. Cement shade: if the PLV has extremely thin cross section (<0.3mm) then cement shade might influence the shade of the veneer drastically.<sup>7</sup>
16. Those patients with darker skin tones should be advised to select naturally occurring tooth shades, as opposed to bleach shades, as the increased contrast between skin and teeth will make even a natural shade appear very white. It follows that those with fairer skin tones can ‘get away’ with very light bleach shades.

**Temporary Restorations:** In second visit , prototypes were fabricated using the “shrink wrap” technique; bis-acrylic was placed in the putty matrix and allowed to self-cure set in the mouth. This allows the prototypes to shrink and lock between the teeth and onto the teeth.<sup>8</sup> These temporaries served as a "test drive" for the planned veneers, allowing the patient to evaluate the shade, shape, and phonetics before committing to the final restorations.



Figure 4: mock up transfer using putty matrix



Figure 5: Provisionalisation

**Finalizing Treatment Plan:** Patient was suggested 8 unit veneers 14 to 24. But the patient opted for 3 veneers with respect to 11 21 22 and for rest of the teeth direct composite veneers <sup>9</sup>. were planned. Once the patient was satisfied with the temporaries, a putty index of the temporaries was made to communicate the desired shade, shape, and other details with the dental laboratory. This step ensures that the final laminate veneers closely match the patient's preferences and expectations. Overall, this step-by-step approach ensures thorough planning, patient involvement, and communication throughout the treatment process, leading to optimal outcomes and patient satisfaction with the final results.

### III. Tooth preparation

The tooth preparation can be classified based on remaining enamel

Le Sage classification: <sup>8</sup>

Reduction	Facial	Enamel remaining
<b>CL-I</b> No-prep or practically prep-less	Detectable with magnification, with or without gingival finish lines	95–100%
<b>CL-II</b> Modified prep-less or minimally invasive	Up to 0.5 mm	80–95%
<b>CL-III</b> Conservative design	0.5–1 mm	50–80%
<b>CL-IV</b> Conventional all-ceramic design	1+ mm	<50%

The amount of remaining enamel strongly influences the bonding between luting cement and tooth.<sup>10</sup>

Guidelines for tooth preparation: <sup>11</sup>

1. Ideally, for feldspathic porcelain, the thickness of the porcelain laminate veneer should be no less than 0.5 mm, and for lithium disilicate (IPS e.max Ivoclar Vivadent), it should be at least 0.3 mm.
2. In areas subjected to high stress, such as incisal regions, porcelain should ideally be 1.0–1.5 mm thick. Sufficient incisal reduction not only facilitates proper fitting during insertion and cementation but also conceals incisal margins effectively.
3. Avoid sharp line angles in preparations as they can create stress points, potentially leading to porcelain veneer fractures over time.
4. Adequate reduction at the gingival third of the tooth is crucial to prevent overcontouring of the porcelain. Proper reduction in this area ensures a natural emergence profile, vital for both aesthetics and periodontal health.
5. Proximal preparation enables the hiding of interproximal finishing lines and offers additional wrap-around for improved bond strengths (more enamel to bond with). Increased porcelain thickness at the edges reduces the likelihood of chipping during insertion, enhancing restoration durability.

Things to avoid in tooth preparation: <sup>11</sup>

1. Do not arbitrarily prepare the surface of the tooth. Always use a guided approach using various methods like APT preparation technique or use putty matrix to ensure adequate reduction and prevent overpreparation to keep the preparation as conservative as possible, and keep the preparation within the enamel.



Figure 6: Wrong(left) v/s right preparation(right), note the rounded labioincisal line angle <sup>11</sup>

2. Avoid creating sharp line angles within the preparation. Sharp labioincisal line angle invites porcelain fracture, also it creates a clear demarcation between the incisal and body porcelain creating an uneasthetic appearance.

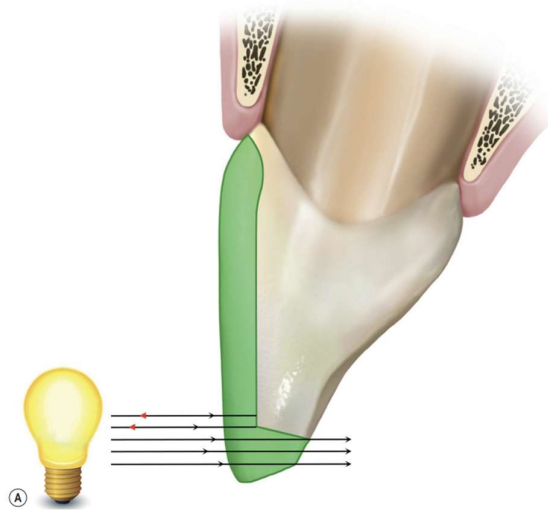


Figure 7: Demarcation of UR (unrounded) labial–incisal angle between the restoration’s incisal and body shades.<sup>11</sup>

Typically there are 4 designs for tooth preparation as shown below, incisal bevel with butt joint being the most versatile one , and the one indicated in this case.

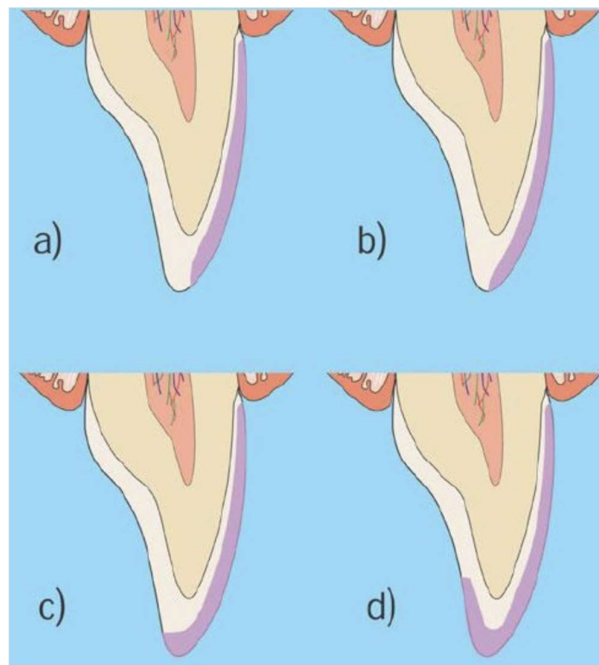


Figure 8: Various preparation designs a) window b) feather c) incisal bevel d) incisal overlap<sup>12</sup>



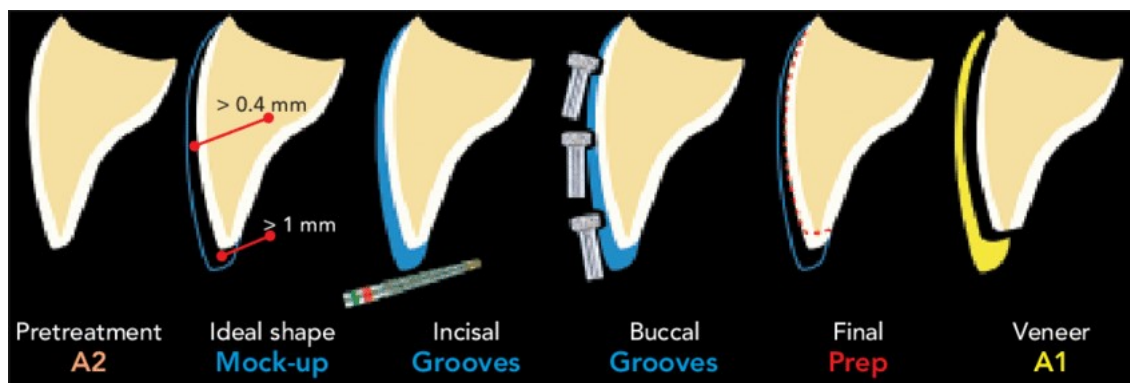


Figure 9: Selected preparation design <sup>13</sup>

**Margins:**

**Gingival:** A chamfer, subgingival margin was selected.

**Proximally:** The contacts were kept intact, which also enhanced the amount of enamel for bonding.

**Incisally:** Incisal bevel, a butt joint preparation was selected.

The APT Preparation Technique: <sup>14</sup>

Dr Galip Gurel introduced the Aesthetic PreEvaluative Temporary ('APT') technique in 2003. This is a preparation method wherein the teeth are prepared directly through the bis-acryl mock-up, ensuring minimal removal of tooth structure. The APT technique is indicated in esthetic cases where the arch is being expanded or length and volume are being added to the teeth, although it can be used in a reductive scenario as long as prepreparation enameloplasty is first performed (i.e. first making all teeth fit within the putty matrix). <sup>15</sup>



Figure 10: Provisional restoration guided preparation, orientation depth grooves marked

The goal was to maintain tooth structure while ensuring adequate thickness for the final restorations. Facial preparation was done in three planes using depth-cutting burs (model S850, Brasseler, Germany), with a depth of 0.3mm in the gingival third and 0.7mm in the incisal third. Grooves were marked using a pencil (Figure x). Additionally, 2mm of incisal reduction was carried out with the provisionals in place. Subsequently, the provisionals were removed, followed by reduction of facial surface with a round-end taper bur until all the depth grooves merged seamlessly



with the rest of the tooth surface. preparation was extended proximally just facial to the contact points. Retraction cords (000 cord were placed for central incisors and 00 for lateral incisor) were placed, to help in placing the gingival margins subgingivally. labioincisal line angles were rounded off to enhance structural integrity and aesthetics of the final restoration.

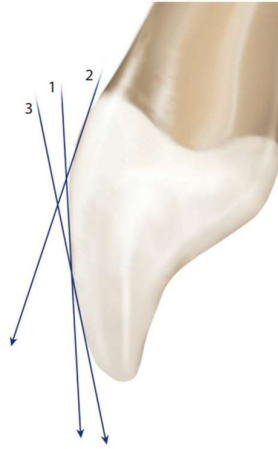


Figure 11: 3 plane reduction

#### **IV. Impression process**

000 cord was placed for 5 minutes to achieve gingival retraction and exposure of subgingival margins.<sup>15</sup> A single step sectional impression was made with addition silicone using putty wash technique. Impression of opposing arch was made using irreversible hydrocolloid



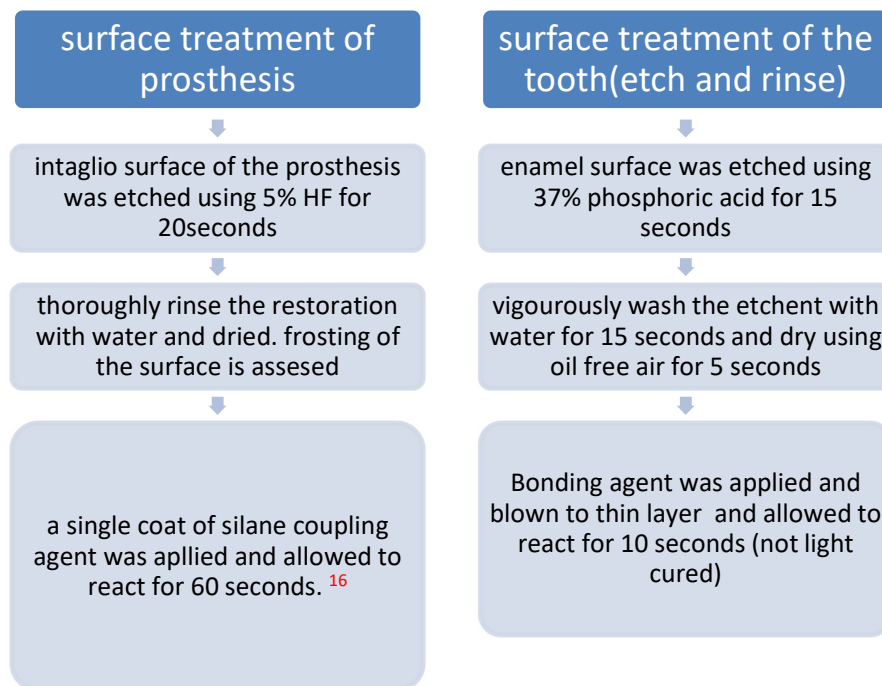
Figure 12: Final tooth preparation with gingival retraction



Figure 13: Single step putty wash impression

### V. Try in and bonding

In the 4<sup>th</sup> visit, the final restorations were tried and with the agreement by the patient the bonding procedure was initiated. Adjacent teeth were isolated using Teflon tape. The following bonding protocol was followed:



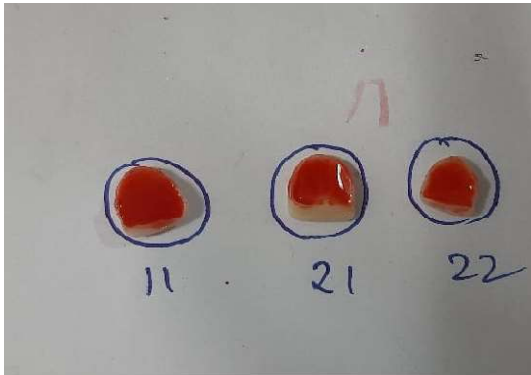


Figure 14: Etching of intaglio surface using 5% HF



Figure 15: Note the frosted appearance



Figure 16: Etched enamel surface note the frosting



Figure 17: Bonding agent applied on the surface



Figure 18: Final veneers (#11, #21 & #22) and direct composite veneers (#14, #13, #12 & #23) in place



Figure 19: Extra oral picture of the patient



Figure 20: Preoperative, post operative image

## **VI. Cementation**

Dual cure resin cement was dispensed on the intaglio surface of the prosthesis keeping the tip submerged in the cement to avoid entrapment of air, and the prosthesis was seated in final position following the sequence of cementation. The cement was tack cured for 2 seconds while maintain pressure on the prosthesis, excess cement was removed, liquid strip was applied on the margins and final curing was done, 20 seconds on each surface. The cure should begin from the palatal surface to ensure shrinkage towards the tooth surface. Using porcelain polishing bur polish the margins.

### **Case 2:**

A 24 year old patient reported to the department with the poor appearance due missing front tooth and discoloured tooth. Patient presented with missing 21 and the patient had a history of trauma which led to the loss of the left central incisor. Remaining teeth were discoloured and rough due to fluorosis. patient wanted replacement of the missing teeth and correction of the staining of the tooth. The patient was presented with the various treatment options, but the patient opted for a fixed partial denture wrt 11 21 22 and porcelain laminates for 12 13 and 33.



Figure 21: Preoperative intraoral photograph

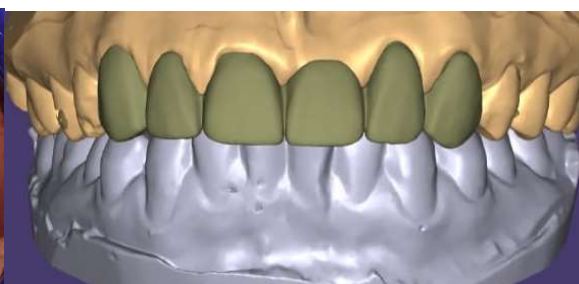


Figure 22: Digital mock up



Figure 23: Tooth preparation for FPD wrt #11 #21 #22: depth orientation groves marked wrt #12 #23





Figure 24: Single step putty wash impression



Figure 25: Provisional restoration



Figure 26: Final restoration in place





Figure 27: pre and post operative extraoral photograph of the patient

#### **VII. Home care instruction**

Patient was instructed not to eat coloured food for 24 hrs. Not to bite or shear hard food like hard fruits and ice with the front teeth. Instruction to provide information to the operator about the veneers whenever undergoing scaling procedure.

#### **VIII. Conclusion**

The porcelain laminate veneer was selected to provide desired aesthetics and longevity of the treatment.

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