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"FROM ORDINARY TO EXTRAORDINARY ESTHETIC REHABILITATION -A CLINICAL APPLICATION OF COMPOSITE AND PORCELAIN INDIRECT VENEER CASE REPORTS."

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ABSTRACT
Restoring a patient's dental aesthetics is a key concern in modern dentistry. To address this, new treatment methods and tools are continuously being introduced. For anterior teeth, where aesthetics are particularly important, many dentists opt for more conservative and visually appealing options such as direct and indirect laminate veneer restorations instead of full-ceramic crowns. Veneers have quickly become one of the most successful innovations in dentistry, offering a tooth-colored covering that can restore intrinsic discoloration, as well as localized or generalized imperfections. Any restoration must adhere to mechanical, biological, and aesthetic standards to ensure its success. The color, shape, structural, and positional abnormalities of anterior teeth can lead to significant aesthetic challenges for patients, making veneers an ideal solution.

KEYWORDS: Conservative, anterior restoration, laminates, smiles designing, esthetics in dentistry.

INTRODUCTION
Aesthetics, derived from the Greek word "aisthetike," was introduced by philosopher Alexander Gottlieb Baumgarten in 1735 to describe the study of sensory perception. In dentistry, aesthetics refers to the application of both art and science to enhance or restore the beauty of a smile, while maintaining functional and physiological balance.[1]

For issues such as malformed, misaligned, or slightly damaged teeth, modern dental materials bonded adhesively can effectively restore aesthetics with minimal invasiveness, preserving most of the natural tooth structure.[2] Resin composites are commonly used for this purpose, particularly to conceal tooth discolorations and alter tooth contours. However, resin composites are prone to staining, discoloration, wear, and marginal fractures, which can compromise the long-term aesthetic outcome.

When resin composites are polymerized outside the mouth in a lab using light, heat, or other techniques, shrinkage occurs before the restoration is bonded, leaving only a thin luting composite resin layer that undergoes shrinkage at the tooth-restoration interface. This minimizes marginal gaps, reducing the risk of leakage, sensitivity, recurrent decay, and staining.[3] Additionally, these lab techniques enhance polymerization, improving the physical properties like tensile strength and hardness, leading to stronger, more durable restorations.

Porcelain veneers, introduced by Charles Pincus in 1938, have become a popular choice for aesthetic enhancement. These veneers offer excellent aesthetic results, durability, and superior marginal integrity, along with high compatibility with soft tissues. Moreover, they conserve more natural tooth structure compared to other full coverage restorations such as porcelain-fused-to-metal or all-porcelain options.

According to Manuele Mancini, ceramic veneers are a versatile treatment option for various dental issues[5], including:
1. Abrasion
2. Coronal fractures

3. Correcting tooth defects such as closing interdental spaces and restoring malformed teeth where crowns are not suitable.
4. Diastema (gaps between teeth)
5. Orthodontic-related corrections, such as size and shape discrepancies that cannot be resolved through orthodontics alone.
6. Tooth discoloration, particularly in cases unresponsive to tooth whitening or micro-abrasion.
7. Occlusion adjustments, including realigning in-standing, rotated, or protruding teeth.

Ceramic veneers offer long-term survival rates that surpass both direct and indirect composite resin veneers. This case series demonstrates the aesthetic benefits of ceramic veneers in restoring a balanced and attractive smile through this restorative approach.

CASE REPORT 1

A 36 year-old female patient visited the Department of Prosthodontics and Crown & Bridge at career postgraduate of dental sciences, lucknow India, with concerns about fractured anterior tooth and a desire for cosmetic rehabilitation. Upon examination, the provisional diagnosis was enamel hypoplasia due to moderate fluorosis. Following a dentofacial analysis and shade selection, an appropriate shade was chosen for the anterior laminates. The treatment goals were to address the discoloration and enhance the contour of the teeth using a conservative approach. Indirect Composite veneers were planned for the maxillary anterior teeth, and after obtaining the patient's consent, she was thoroughly informed about his condition and the treatment process.

TREATMENT PROCEDURE

The treatment plan involved placing composite indirect veneers on both the upper anterior teeth. Diagnostic impressions were taken, and a face bow record was transferred to an articulator (Figure 3). The maxillary and mandibular casts were mounted on the articulator, followed by a diagnostic wax-up. A "test drive" was performed. A thorough evaluation of the aesthetics and occlusion was conducted, along with an assessment of the patient's speech and phonetics. Upon receiving the patient’s approval, shade selection was completed, and the preparation process commenced.

The incisal wraparound preparation was performed on teeth 11, 21. This type of preparation was chosen for its versatility, ease of fabrication for the technician, and manageability for the dentist, as it allows for better seating during delivery. Incisal wraparound preparation also provides optimal support for the restoration and distributes occlusal forces over a larger surface area. Additionally, reducing the incisal edge enables better incisal translucency. A 0.3 mm labial reduction was performed using a depth-cutting bur, with chamfer used as the finish line, and all line angles were rounded.

A 2-0 retraction cord was placed for gingival retraction, and a two-step impression was taken using polyvinyl siloxane impression material putty and light body.

Preparation of Veneers for Bonding

- The restoration was thoroughly cleaned with acetone or Cavilax.
- Indirect Composite Veneers were etched with 10% hydrofluoric acid for 10 seconds, rinsed with water, and air-dried.

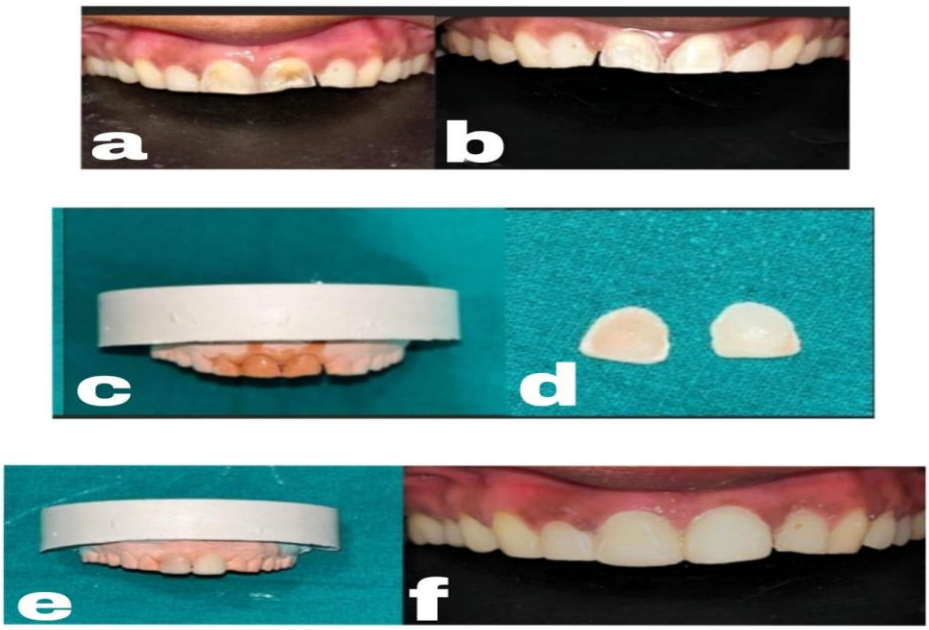
Preparation of Teeth for Bonding

- The tooth surfaces were cleaned, and 37% phosphoric acid was used for etching for 15 seconds, and then air-dried.
- A bonding agent was applied and light-cured for 10 seconds.
- A dual-cure resin luting agent was used for cementation. The veneer was placed over the prepared surface with gentle pressure to allow excess material to drain, preventing air bubbles or veneer lifting. Initial spot curing was done for 5 seconds, excess cement was removed using an explorer, and final curing was performed for 20 seconds. The same steps were followed for the final cementation of all veneers (Figures 18, 19). The patient was highly satisfied with the outcome (Figure 20).

Post-Bonding Steps

- Excess bonding material was removed with a sharp carver.
- Floss was used between each veneer to remove remaining cement.
- Final finishing was completed using carbides, discs, and rubber points.
- Occlusion was checked and adjusted as necessary.

The patient was advised to follow a strict follow-up schedule at 1 week, 3 months, and 6 months to monitor the treatment and maintain oral hygiene.



a - pre-operative, b - tooth preparation done, c - separating medium placed, d,e - indirect composite fabrication, f - post operative.

CASE REPORT 2

27-year old male patient reported to the department of Conservative and Endodontics with a chief complaint of fractured anterior tooth. Several solutions were discussed with the patient such as orthodontic treatment, which the patient refused, porcelain veneers, which were considered expensive to her, porcelain crowns, but they were no conservative, and direct composite veneers, which the patient refused due to her inability to keep the mouth opened for too long during treatment. Finally, the patient agreed to get the esthetic problem solved with indirect composite laminate veneers.

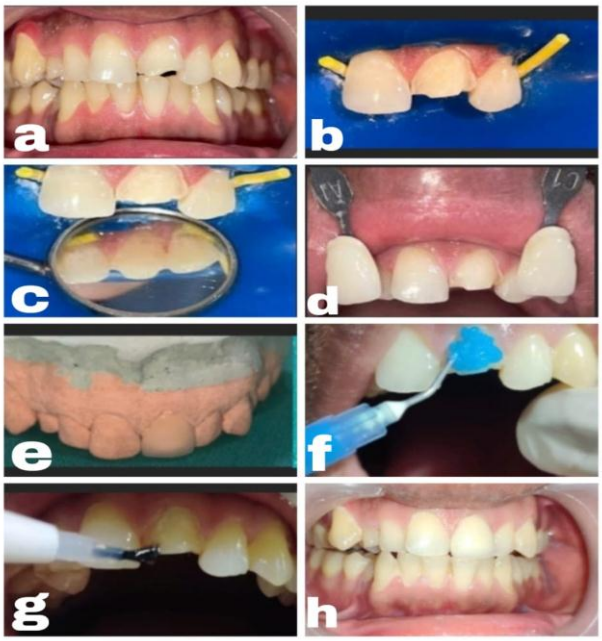
Treatment procedure

The outline of the procedure involved preparing the entire facial surface of the teeth, extending approximately 0.5 to 1 mm below the gingival margin and into the facial embrasures. Using a coarse, tapered, rounded-end diamond bur, around half of the enamel was removed (0.3 mm in the gingival region to 0.75 mm in the mid-facial and incisal regions). The incisal edge was reduced by approximately 1 mm. After placing a retraction cord (GINGI-PAK 00), impressions were taken using condensation silicone materials (Protesil Putty and Light Condensation Silicone). A temporary prosthesis was fabricated directly using a preoperative impression and acrylic paste, along with a layer of composite resin.

Once a cast of the prepared teeth was created, veneers were waxed up on the cast, and a silicone key was prepared to aid in building the incisal edges of the composite veneers. After isolating the cast with silicate, a gingival shade (Dentin composite #A2, Composite Tetric-n-Ceram, Ivoclar Vivadent, USA) was applied to cover the gingival third of the tooth. The composite was feathered into the middle third, smoothed, and cured. Then, the incisal shade (Enamel composite/translucent, ICE Restorative System, SDI and Australia) was applied to the middle third and incisal area to achieve the desired contour and colour. The facial contour was checked using an incisal view with a mirror before polymerizing the composite with LED light for 20 seconds per layer at an intensity of 850 mw/cm². Final finishing was deferred until all six veneers were placed

After constructing the veneers, they were submerged in boiling water for five minutes to enhance the degree of conversion. During application to the patient, a matrix was placed between each tooth and its neighboring one. The teeth were etched using 37% phosphoric acid (Prime-Dent, USA) for 15 seconds, rinsed for 30 seconds with water, and dried. A thin layer of bonding agent (Bonding Resin, Prime-Dent, USA) was applied with a small brush and left uncured.

The inner surfaces of the veneers were etched using 10% hydrofluoric acid (Condacporcelana/FGM, Brazil) for one minute, rinsed for 30 seconds, and dried. A thin layer of silane agent (SILANO Prosil/FGM, Brazil) was applied and left for one minute, then dried with an oil-free air stream. Each veneer was cured for 40 seconds to finalize the curing of the resin cement. Once the veneers were bonded, all residual resin was removed, and composite finishing burs, along with aluminum oxide powder on a rubber bur, were used to polish and smooth the veneer surfaces. The final result was.



a - pre-operative, b,c - tooth preparation under isolation (rubber dam) d - shade selection, e - porcelain veneer fabrication, f - acid etching, g - application of dentine bonding agent, h - post-operative aesthetically pleasing, particularly as the patient was satisfied with the closure of spaces between the front teeth.

The patient was given instructions for post-procedure care, such as adhering to a soft diet for three days and following a strict oral hygiene routine to maintain the stability and longevity of the veneers.

For bonding, light-cured or dual-cured resin cement (Metacem Resin Cement/META) was mixed and applied to the veneers. The veneers were gently placed onto the teeth and cured using light from a distance of 5 cm for 5 seconds.

DISCUSSION

Patient selection plays a critical role in the success of porcelain laminate veneers (PLVs). In this case, due to the patient's young age and reluctance to undergo extensive orthodontic treatment, a conservative approach with PLVs was chosen. This treatment option was ideal as the patient had a favorable smile line, no parafunctional habits, and sufficient enamel, making PLVs the most suitable choice. The advantages of these restorations include their biocompatibility, chemical stability, and reduced cytotoxicity, low risk of irritation or sensitivity, and high resistance to wear. Additionally, PLVs offer a conservative approach that preserves the natural tooth structure.

The smooth, glazed surface of PLVs reduces plaque accumulation and simplifies cleaning. However, PLVs are fragile prior to cementation due to their thinness (0.3-0.5mm). Once bonded to the etched enamel, however, they integrate with the tooth structure and become much more durable. The bond between the porcelain, etched enamel, composite resin-luting agent, and silane coupling agent creates a long-lasting restoration. That said, PLVs should be avoided in cases where enamel is compromised, where parafunctional habits like bruxism or clenching are present, or where the teeth have an inappropriate anatomical presentation. Other factors that may contribute to veneer failure include bonding to pre-existing composite restorations, unskilled application, and using veneers on severely worn teeth with substantial dentin exposure.

Research indicates that if the luting composite is too thick and the porcelain is too thin, there is an increased risk of veneer cracking due to heat fluctuations. This can occur if the veneer does not fit properly or if excessive die spacer is used to mask underlying tooth discoloration. The optimal thickness ratio of ceramic to luting composite should be greater than 3 to minimize cracking.

In some cases, composite restorations can be used instead of PLVs to address issues like tooth discoloration or irregular shapes. Common aesthetic concerns in young individuals, such as enamel hypoplasia, midline diastemas, and peg laterals, are often conservatively treated with PLVs. However, composites have limitations, including susceptibility to wear, marginal fractures, and discoloration, which raises concerns about their long-term durability.

Computer-aided design and manufacturing (CAD/CAM) technology offers a standardized and predictable workflow for both simple and complex restorations. It is also cost-effective and time-saving. As CAD/CAM technology advances, it is likely to play a more significant role in dentistry. However, further long-term clinical studies are necessary to assess the performance of minimally invasive and extensive restorations

supported by zirconia teeth and monolithic polymer-infiltrated ceramic networks.

CONCLUSION

With advancements in composite resins, indirect composite laminate veneers have emerged as a viable treatment option for patients with aesthetic concerns related to their anterior teeth, particularly when combined with proper oral hygiene practices. Over the past few decades, these veneers have undergone significant improvements, evolving into a reliable restorative solution that offers longevity, favorable periodontal response, and high levels of patient satisfaction. Indirect composite veneers present a conservative alternative to full-coverage restorations, as they require minimal dental preparation, thereby preserving more of the natural tooth structure.

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