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Direct Composite Veneers: A Simplified Approach (Second Edition)

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PUBLICATION DATE:	MARCH 2021
EXPIRATION DATE:	FEBRUARY 2024

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Direct composite veneers: a simplified approach (second edition)

ABSTRACT

Direct composite veneers serve as one method for restoring anterior teeth. However, many dentists shy away from this procedure due to a lack of innate artistic talent, lack of experience, past failures, and the length of time needed to complete the procedure. As a result, they opt for laboratory-fabricated alternatives, resulting in deep preparation designs. This course will demonstrate the steps required to fabricate direct composite veneers in a highly simplified manner using veneer templates and microhybrid composite resin.

EDUCATIONAL OBJECTIVES

The focus of this clinical study will provide the dental professional with the steps needed to fabricate direct composite veneers in a highly simplified manner. After reading this article, the reader should be able to:

1. Describe the properties of esthetic composite resin
2. Describe technique differences between direct and indirect veneers
3. Refer to the history of direct composite veneers
4. Restore anterior teeth in a rapid manner using the materials outlined with the steps discussed

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INTRODUCTION

Veneers are created for patients based on a multitude of needs. They may be required to esthetically correct misalignment, form, color, and spacing issues of anterior teeth. They may also be necessary to restore carious lesions. Regardless of need, veneers can be fabricated as indirect restorations using porcelain or composite resin, or as direct restorations using composite resin. With the direct method, the restorative material must be placed and completed in one appointment. The final result depends entirely on the proficiency and artistry of the dentist. However, the length of time needed to perform this treatment and the difficulty of the technique have limited it to those talented few with the proper abilities. This alone is why many in our profession may choose or prefer to use indirect restorations. However, new resin restorative materials and preformed veneer templates have opened this treatment modality to any dentist regardless of skill level or creative ability.[1]

DISCUSSION

Direct composite veneers are one option for veneering teeth, and for more than 60 years the science and application of direct composite resin have grown and matured. The application of composite resin has progressed into a high-level service demonstrating excellent results, especially in vital teeth.

Historically, it is Charles Pincus, a California dentist, who is credited with inventing the veneer in 1928.[2] The temporary veneers were to be used for a film shoot, changing the appearance of the actors' teeth. Nearly a decade later, Pincus fabricated acrylic veneers that had to be retained using denture adhesive, due to lack of adequate permanent adhesives. In 1959, the concept of acid etching by Buonocore was the vanguard of adhesive dentistry, allowing the bonding of enamel to porcelain veneers.[3]

Research performed by Simonsen and Calamia in 1982 demonstrated the acid etching of porcelain using hydrofluoric acid.[4] Thus, porcelain and composite resins could achieve an adequate bonding strength, resulting in the permanent fixation of porcelain to enamel.

The reasons for choosing this treatment method can be many and varied. They include correction of esthetic concerns, attrition and erosion, abfraction, fractures, caries, diastemas, restoring proximal contact, occlusal discrepancies, the desire for a minimally invasive approach, and the financial limitations of the patient.[5-10] Also, of significant benefit is their use in medically compromised patients who display dental anomalies as secondary signs of conditions such as fluorosis and amelogenesis imperfecta.[11,12]

A retrospective, longitudinal clinical study by Coelho-de-Souza et al. "investigated the performance of direct veneers using different composites (microfilled X universal) in vital or nonvital anterior teeth . . . A total of 196 veneers were evaluated, with 39 failures."[5] They concluded that "[d]irect composite veneers showed a satisfactory clinical performance. Veneers performed in vital teeth showed a better performance than those placed in nonvital teeth."[5]

When compared to porcelain, research has shown that direct composite holds up just as well.[13-15] In a study by Rosentritt et al., toothbrush abrasion and in vitro aging on ceramic (indirect technique) and composite veneers (direct technique) were investigated.[16,17] A five-year period of oral service was simulated by thermal cycling and mechanical loading. The results showed that all materials had comparable wear resistance, failure rates, and satisfying longevity.

Batalocco et al. published a study with the aim of investigating "whether there is a direct correlation between the amount of residual tooth structure in a fractured maxillary incisor and the fracture resistance of composite resin restorations or porcelain veneers after cyclic loading. Sixty human-extracted maxillary central and lateral incisors were mounted in an acrylic block with the coronal aspect of the tooth protruding from the block surface. The teeth were assigned to two groups: 2 mm incisal fracture and 4 mm incisal fracture. Then, the teeth were further divided into two different restoration subgroups, porcelain laminate veneer and composite resin restoration, therefore obtaining four groups for the study." They concluded that a "composite resin restoration and a porcelain veneer could perform similarly for replacing a fractured incisor edge up to 4 mm."[13]

METHODS

In the past, direct composite veneers were fabricated using a host of materials and techniques. In 1976, Faunce and Myers reported the "no-tooth-reduction" method of direct resin veneers using cold-cure bonding materials (Concise by 3M and Adaptic by Johnson & Johnson) polymerized with the Nuva-Lite system (Dentsply/Caulk).[18] This technique was revolutionary and would set the stage for a future in which composite veneers would be an everyday treatment. According to Faunce and Myers, "Direct bonding of composite resins to fractured or discolored teeth has been shown to be a practical and effective method for restoring teeth. Previously, lack of uniform shade matching and excessive bulkiness of material have been associated with full veneer bonding. The ultraviolet light (Nuva-Lite) in our studies penetrates veneers as thick as 2 mm and effectively cures the filler material. We also have used cold-curing bonding materials (Concise and Adaptic) and they seem to be equally effective, although working time is shortened. We have had no clinical problems with this technique and after two years the veneers are intact. A technique has been presented that requires no tooth reduction, except where necessary for caries removal, or time-consuming contouring and color shading. Laminate veneers enable the dental practitioner to obtain consistent esthetics with minimal chair time. Further evaluation of this technique to restore malformed, fractured, or discolored permanent incisors is being conducted."[18]

More than a decade later, Larson and Phair reviewed the methods to duplicate the intricate color distribution and surface texture of natural tooth structure using a direct bonded, microfilled composite resin veneer.[19] "This technique creates a direct bonded microfilled composite resin veneer that replicates the complex color distribution and surface texture of the natural

tooth structure. Duplicating the complexity of natural tooth color can be repeated by recording the different layers of color used in their sequence of placement."[19] With time, this technique was improved using opacifiers and tints and streamlined with preformed transparent acrylic resin matrices and unique freehand methods.[20-22]

In addition, other materials and procedures were introduced as a direct attempt to enhance the efficiency of these techniques.[23] These included composite resins, opaquers, and tints for the "predictable restoration of discolored anterior dentition with direct/indirect heat-treated composite resin veneers in a single appointment."[23]

The "indirect-direct" application of preformed acrylic laminate veneers with bonded composite resin was attempted (Mastique laminate veneers by DeTrey, Dentsply) with disappointing results.[24] In a study by Høffding, these plastic veneers were evaluated over four- and 10-year periods.[25] It was found that they detached from the tooth surface due to poor bond chemistries, demonstrated a low resistance to abrasion, and exhibited marginal leakage and discoloration.

Høffding reported that the purpose of the study was "to evaluate the clinical quality over four years and the longevity over 10 years of 77 Mastique laminate veneers (DeTrey, Dentsply). The veneers were bonded to incisors and canines with a light-cured composite resin, using the acid-etch technique, and examined every 1/2 year in accordance with USPHS criteria. Anatomic form and marginal adaptation were rated excellent in more than 50% of the veneers throughout the study. Moderate surface wear was seen in most of the veneers after four years of service. Marginal discoloration and color match were recorded as not acceptable in 20% of the veneers at the four-year control. No significant difference was found in the gingival index between veneer and control teeth. The cumulative retention rate was 40% after four years and 20% at the 10-year recall. Owing to the high frequency of spontaneous loss, Mastique laminate veneers cannot be recommended as permanent restorations."[25]

Iterations of this concept were developed including thin, prepolymerized, hybrid composite shells (Componeer system, Coltene, Altstätten, Switzerland), and more recently, laser-sintered, thermally tempered composite veneers (Edelweiss, Ultradent) that demonstrate promise.[26,27]

Other attempts have been made to speed the process of direct resin veneers. One such concept was the use of preformed, clear mylar matrices in the shape of veneers with attached interproximal strips in a variety of sizes (Mylaforms, Plastodontics). Another, the "split-splint" technique, involved sending the lab an impression of the existing dentition.[28] A stone model was made and a technician would wax up the model as if in preparation for creating indirect veneers. A refractory model was created upon which two vacuform shells were made. The soft shell was perforated on the midfacial for each tooth to be veneered. These holes accommodated the tip of composite compules. Interproximal slits were made to allow clear matrices to be used to maintain clean contacts and reduce the amount of cleanup required. The rigid shell helped maintain the final form prior to curing. Regardless of technique, success or failure is often dependent on the material used to achieve the end goal.

MATERIALS

Direct composite resin: Direct composite resin should fluoresce and bear opalescent qualities of natural tooth structure, especially since patients are seen under various lighting conditions.[29,30] It should have low-translucent, high-fluorescent dentin shades, combined with highly translucent/opalescent enamel shades to facilitate the superior reproduction of natural teeth.[31,32] The composite resin should be sculptable with enough body to prevent slumping and be easy to polish, offering a high luster.[33-35] A perfect match to either stock or custom shade guides is a must, and the system should be available in many shades. A high radiopacity is necessary to distinguish the restoration from both tooth structure and future caries.[36] In addition, the composite should have a regular or average filler particle size to avoid pitting during finishing and polishing and continue providing a high polish during its lifetime.[37]

Microhybrid composite resins have been one of the preferred materials for direct veneering. They have the ability to retain a high polish similar to microfills, with the strength of hybrid resin.

The long-term maintenance of the surface quality of materials is fundamental to improving the longevity of esthetic restorations. Of great significance is the lifespan of these materials, including strength, color stability, and polish, among others. In addition, having an average particle filler size of 0.7 µm offers the ability to impart a high polish and luster typically seen in finer microfill resins.[38-41] A study by Pala et al. "aimed to evaluate the flexural strength and microhardness of three different anterior composites after 10,000 thermocycles."[41] It was concluded that the nanofill composite "displayed significantly higher microhardness values. However, each resin composite was statistically similar for flexural strength values. Ten thousand thermocycles significantly affected microhardness and flexural strength."[41]

Direct composite template: Following in the tradition of simplified direct anterior veneers, a system has been created to ease the difficulty and shorten the time needed for the process. A kit of 32 autoclavable, translucent templates in two universal sizes that mimic the precise anatomic facial contour of upper and lower teeth, including the second premolars, is available (UVeneer, Dental Art Innovations, St. Kilda, Australia). The templates can be used with any preferred composite material, producing consistent, predictable, perfect results with regard to final tooth shape, shine, and smile design.

Following tooth preparation and routine adhesive bonding techniques, composite resin is applied to the entire restorable surface, and the template is then pressed onto the composite. Once excess material has been removed and the interproximal areas adequately separated and contoured, the composite is light cured through the template. With a nonstick surface, the template is removed, leaving a high-gloss finish. The template offers the additional benefit of removing the oxygen inhibition

FIGURE 1: Case presentation

FIGURE 2: False pocket

FIGURE 3: Surgery with a diode laser

layer (similar to the finish after mylar strip removal), thereby increasing composite strength.[42]

This system offers several distinct advantages. At its most basic, there is an economy of material and time: The template dictates the amount of composite resin needed per tooth, preventing waste and thereby avoiding the overbuilding/cutback process. Also, because of the variants in template contour, a greater amount of composite is imparted in the midfacial and less as the restoration progresses toward the inciso/gingivo/facial aspects.[43,44] In an article by Lowe, this idea was described as follows: ". . . this varied thickness of material creates different effects and values and, as a result, only one shade of composite is needed in many cases to get a natural gradient effect, obviating the need to use different shades using a layering technique."[45] This simplified method is one that less-experienced practitioners can embrace.

APPLICATIONS

In addition to direct composite veneers, preformed universal veneer templates offer other benefits in clinical practice:

- Ease of use
- Can enhance clinic productivity significantly
- Saves time—no need to spend time and effort on carving and polishing
- Requires minimal preparation
- Cost effective

When to use UVeneer:

- For all composite veneer applications, for one or multiple teeth, to correct diastemas, fractures, abrasions, discolored or mispositioned teeth, caries restoration, and other esthetic corrections
- For the creation of temporary veneers between appointments while porcelain veneers are being made in the lab
- For direct chairside mock-ups before conducting the procedure
- Class V, and full-veneer coverage from one tooth up to 10 teeth per arch, from central incisor to second bicuspid
- Direct composite veneer restorations
- Cosmetic preview mock-up and shade selection
- Temporary veneers
- Laboratory model wax-up

CASE REPORT

The patient, a 23-year-old female, presented for a routine prophylaxis and exam. Due to a history of allergy-induced mouth breathing and medication-induced xerostomia, the desiccated anterior teeth had multiple carious lesions (figure 1). Often originating as "white spots," these occult lesions are found in patients due to a variety of reasons including diet, fluorosis, enamel hypoplasia, plaque accumulation, and dehydration. In addition, the teeth were malpositioned and the marginal tissue inflamed.

Following a smile evaluation, it was explained to the patient that her wide smile allowed visibility of the posterior teeth bilaterally. It was agreed that composite veneers would be placed from the

FIGURE 4: Placing flowable composite

FIGURE 5: UVeneer templates tried against teeth

FIGURE 6: Aligning UVeneer

FIGURE 7: Removing template after curing composite

FIGURE 8: Restoring remaining teeth

FIGURE 9: Polishing the direct composite veneers

FIGURE 10: One week later

right to left upper second premolars.

Following local anesthesia, the gingival tissue was sculpted to create symmetry. A false pocket caused by lingual malposition of the upper left lateral incisor was probed (figure 2). The pocket was measured prior to the gingivoplasty to ensure that the biologic width was not violated. Surgery was performed on the tissue using a diode laser (figure 3).

Following the removal of the carious lesions, mylar strips and/or Teflon tape was inserted between the teeth. The preparations were then etched, rinsed, and dried. A fifth-generation bonding agent was applied and cured. A flowable composite was used to restore these small, irregular areas (figure 4).

Next, the appropriate UVeneer templates were selected from the kit and tried against the teeth (figure 5). A B1 shade composite was selected and applied to the entire surface of the upper right central incisor. The central line on the UVeneer template was aligned with the long axis of the tooth and gently pressed (figure 6). Excess composite was removed around the edges of the veneer to reduce the need for trimming after curing. The composite was then cured through the UVeneer template. The template was removed by pulling on the handle (figure 7). Additional excess resin was removed from the margins of the veneer.

The remaining teeth were restored in the same manner (figure 8), and the direct composite veneers were polished as needed (figure 9). One week later, the soft tissues appeared healed and healthy (figure 10), and the patient was placed on four-month recare.

CONCLUSION

It is now possible for any dentist to consistently and cost effectively produce composite veneers that are predictable in final tooth shape and smile design. The UVeneer system has eliminated those barriers so that virtually any practitioner can now accomplish this in a short amount of time, with the results being a perfectly designed direct composite veneer case. Unlike prefabricated veneer systems, with UVeneer, dentists use their own composite and can also use layering techniques. The UVeneer process removes several shortcomings of prefabricated systems, including thickness, sizing, shade restrictions, cost, and stock holding. It's so easy that dentists can incorporate more direct composite veneer work into their schedules, creating a real opportunity to increase practice income.

Now, dentists can give patients the option of composite veneers without hesitation. UVeneer is a kit system that can be used to create final provisional veneer restorations for one or multiple teeth; to correct diastemas, fractures, abrasions, and discolored or malpositioned teeth; for caries restoration; for intraoral mock-ups; for study model correction; for communication with the lab technician or orthodontist; and for any other situation when a rapid, perfectly formed composite facing is needed.

It has been demonstrated that the use of a well-formed provisional restoration offers the ability to maintain oral health and promote healing of a surgical site. Using the technique of a fiber-reinforced, directly fabricated provisional prior to extraction is a simple, elegant way to provide this type of care. The technique demonstrated in this case report is simple, reliable, and repeatable.

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QUESTIONS

1. Many dentists avoid placing direct composite veneers due to:
A. Lack of innate artistic talent
B. Lack of experience
C. The length of time needed to complete the procedure
D. All of the above

2. Veneers may be required for all of the following except:
A. Form
B. Esthetic correction of existing proper alignment
C. Color
D. Spacing

3. In a study by Coelho-de-Souza et al., the application of which of the following has progressed into a high-level service demonstrating excellent results?
A. Composite resin in vital teeth
B. ¾ crowns
C. Laminates
D. None of the above

4. The reasons for choosing direct composite for veneering include:
A. Occlusal discrepancies
B. Attrition and erosion
C. Its highly invasive approach
D. A and B

5. The reasons for choosing direct composite for veneering include all but which of the following?
A. Fractures
B. Abfraction
C. Caries
D. Opening proximal contacts

6. Which of the following dental anomalies can benefit from direct composite resin veneers?
A. Fluorosis
B. Amelogenesis imperfecta
C. A and B
D. Meniere's disease

7. Rosentritt conducted a study evaluating toothbrush abrasion and in vitro aging on what materials?
A. Ceramic
B. Direct composite (veneers)
C. Titanium
D. A and B

8. Prior to curing, direct composite resin should be sculptable with enough body to prevent:
A. Slumping
B. Premature curing
C. Dulling
D. None of the above

9. Direct composite should exhibit a high radiopacity on radiographs to distinguish the restoration from:
A. Periodontal ligament
B. Partial framework
C. Alveolar bone
D. Tooth structure and caries

10. Direct composite resin should have:
A. Low-translucent, high-fluorescent dentin shades
B. A nitrogen inhibition layer
C. High-translucent, low-fluorescent dentin shades
D. Lines of demarcation at the margins

11. In the case report, what was the patient's recare frequency?
A. Every 3 months
B. Every 4 months
C. Every 6 months
D. Every 9 months

12. What is the average particle filler size that offers the ability to impart a high polish and luster typically seen in finer microfill resins?
A. 0.7 µm
B. 0.07 µm
C. 7.0 µm
D. None of the above

13. UVeneer can be used for all except which of the following?
A. Temporary veneers
B. Molars
C. Direct composite veneer restorations
D. Cosmetic mock-up

14. Which of the following composite resin types has been one of the preferred materials for direct veneering?
A. Macrohybrid
B. Macrofill
C. Microhybrid
D. None of the above

15. Pincus fabricated acrylic veneers that had to be retained using denture adhesive, due to lack of adequate permanent:
A. Adhesives
B. Etching
C. Polishing
D. A and B

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QUESTIONS

16. Who reported the "no-tooth-reduction" method of direct resin veneers using cold-cure bonding materials?
A. Faunce and Myers
B. Martin and Lewis
C. Parker and Barrow
D. Hale and Denver

17. What feature is necessary to distinguish the composite restoration from tooth structure and future caries?
A. Macro particles
B. Radiolucency
C. Carbon nanotubes
D. High radiopacity

18. The correct sequence of treatment, tooth preparation—adhesive bonding—apply composite—seat template—cure, is necessary for which device mentioned in this course?
A. Mastique
B. Edelweiss
C. UVeneer template
D. None of the above

19. Which one of the following is not a preformed laminate veneer?
A. Edelweiss
B. Componeer
C. Mastique
D. Ridgway

20. Which of the following are universally sized, autoclavable, translucent templates?
A. UVeneer
B. Mastique
C. Split-Splint
D. Mylaforms

21. In the clinical case presented, caries of the anterior teeth was due to:
A. Home care
B. Xerostomia
C. GERD
D. All of the above

22. The upper left lateral incisor was probed prior to the gingivoplasty to ensure that which of the following was not violated?
A. Biologic width
B. The Q continuum
C. Mucogingival junction
D. B and C

23. In the case presented, a gingivoplasty was performed using a:
A. Microscalpel
B. Diode laser
C. A and D
D. Diamond bur

24. Following the removal of the carious lesions, what was inserted between the teeth?
A. Mylar strips
B. Teflon tape
C. Stainless steel matrix
D. A and B

25. Prior to curing, what must be aligned on the UVeneer template?
A. The intercuspid line
B. The scribed horizontal line
C. The scribed vertical line
D. All of the above

26. The template is removed after curing by:
A. Pulling on the handle
B. Chemical means
C. Heating
D. Tapping

27. In the case discussed, what shade was selected?
A. A1
B. B1
C. A2
D. A3

28. At its most basic, using preformed composite veneer templates offers an economy of:
A. Material
B. Salary
C. Time
D. A and C

29. Which of the following dictates the amount of composite resin needed per tooth to prevent waste?
A. Interproximal matrix
B. The remaining enamel only
C. Template
D. All of the above

30. A greater amount of composite is imparted in the midfacial and less as the restoration progresses toward the inciso/gingivo/facial aspects because of the variants in template:
A. Contour
B. Handle angulation
C. Pressure
D. None of the above

PUBLICATION DATE:	MARCH 2021
EXPIRATION DATE:	FEBRUARY 2024

ANSWER SHEET

Direct composite veneers: a simplified approach (second edition)

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EDUCATIONAL OBJECTIVES

1. Describe the properties of esthetic composite resin
2. Describe technique differences between direct and indirect veneers
3. Refer to the history of direct composite veneers
4. Restore anterior teeth in a rapid manner using the materials outlined with the steps discussed

COURSE EVALUATION

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Objective #1: Yes No Objective #2: Yes No

Objective #3: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

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8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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