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Laminate veneers: Preplanning and treatment using digital guided tooth preparation

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Abstract

Objective: The ability to control the reduction of tooth structure in a precise and measurable way during the preparation of ceramic veneers is a clinical challenge. The objective of this article is to introduce a new digital technology that can be used to address this challenge showing its advantages and limitations. First Fit is a digitally guided tooth preparation system that can be used to control the accurate and efficient preparation of teeth. In some cases, the system can be used to prepare the teeth for previously made restorations based on planned digital reduction.
Clinical considerations: The First Fit system uses 3D-printed guides and a specially designed handpiece for guided veneer preparation using either a one-step or a two-step approach. In the one-step approach, final restorations are produced prior to preparation of the teeth using reduction guides, and veneers are cemented on the same day as preparation. The two-step approach includes a preparation phase during which the teeth are prepared using a combination of the reduction guides and free hand techniques. Cementation is then completed at a second appointment.
Conclusion: The First Fit system controls and guides veneer preparation with a minimally invasive approach. In some cases, it enables the production of veneers before tooth preparation, alleviating the need for provisional restorations.
Clinical significance: The guided restorative dentistry technique described here utilizes digital CAD-CAM technology to achieve predictable and accurate results in a minimally invasive and efficient manner.

KEYWORDS
CAD-CAM, digital dentistry, digital smile design, guided dentistry, veneers

1 | INTRODUCTION

Ceramic veneers have been a successful treatment modality since the 1980s. Since their introduction, different techniques for preparation have been proposed to create adequate space for the restorative material. In terms of long-term outcomes, ceramic veneers have been correlated with enamel preservation. The literature shows that the presence or absence of enamel is critical and, as a result, conservative veneer preparation is essential.[1-7]

Coachman et al proposed a three-generation classification to describe veneer preparation techniques. The first generation refers to preparations exclusively guided by calibrated burs to standardize facial and incisal edge reduction.[8] This reduction is driven in part by the existing surface of the tooth and aims to reduce the tooth structure in a uniform way. However, in some instances, this approach can result in aggressive preparations as the technique does not take into account, among other things, the position and anatomy of the final restoration or wear and loss of existing enamel. Consequently, there is high risk of dentin exposure.[9]

The second generation refers to Magne's use of a diagnostic wax-up as a blueprint. In this technique, silicone indices are made over the wax-up to guide incisal and facial reduction.[10] This approach aims to create the necessary space by taking into account the proposed restorative material and the future anatomy of the restoration. It allows for more conservative as well as individualized preparation since customization is not determined or guided by the existing tooth surface. Although the clinician can assess the position of future restorations utilizing this method, the procedure has limited precision and is technique-sensitive since silicone is a flexible material. Another disadvantage is limited visibility through the silicone indices, which prohibits the clinician from observing the entire preparation surface.

The third generation refers to Gürel's aesthetic pre-evaluative temporary (APT) technique.[12,13] This preparation technique involves placing a temporary mock-up fabricated via a diagnostic wax-up over the teeth. The clinician can use the mock-up to determine whether more material should be added, which allows a faster and more conservative preparation as the technique is guided by the position and anatomy of the final restoration. In addition, the APT technique offers the benefit of allowing the clinician to assess esthetics, function, and phonetics before final veneer application.[11,12] However, the technique has some limitations. Subtractive cases require prereduction before the mock-up can occur. Further, it is not unusual that before the facial preparation is completed, part of the APT may dislodge. According to the authors' opinion, a combination of second- and third-generation techniques is a solution that can overcome the limitations described.

The introduction of digital technology has changed the field of veneers, opening up a range of possibilities and workflows including incorporation of natural shapes, printed mock-ups, milled restorations, and facial integration. The aim of this article is to describe a novel technique for digitally guiding the preparation of teeth for veneers using rigid 3D printed guides and to illustrate its indications.

CAD-CAM design software allows for facial integration and the lab technician and clinician to easily check the space needed for the future restoration during the digital wax-up design phase. The facial photo or 3D face scan can be fused to the intraoral scan by overlaying files, allowing real-time feedback on facial esthetics and any changes to the plan, which was not possible in the traditional analog format of stone models. In addition to the wax-up being created in a digital format, dentists, and technicians can use natural shapes taken from digital libraries and interchange them in seconds instead of minutes like traditional wax-ups. This allows the technician to readjust the digital wax-up easily and efficiently, keeping the proposed design as additive, and conservative as possible, without compromising esthetics and/or periodontal health.

The incorporation of 3D-printing technology has allowed the development of rigid preparation guides with a new design that make it possible to overcome some limitations of the silicone indices of the second-generation variety, such as their flexibility issues, and improves the ability to visualize the teeth. Digital technology has afforded advances in the development of diagnostic waxing and has enabled the creation of 3D-printed guides for controlling veneer preparation. Despite these advances, traditional veneer preparation still depends to a large extent on the skill and clinical experience of technicians.

Rigid 3D-printed preparation guides are used in the First Fit system, which is the first commercially available, digitally guided, restorative preparation system. Proprietary software created by Viax Dental Technologies (Miami, Florida) is used to generate a digital veneer preparation model based on the digital diagnostic wax-up of the final restorations. A sequence of 3D-printed guides is generated for accurate guidance of veneer preparation, and a specially designed handpiece engages the guides and allows the clinician to prepare the veneer according to the digital plan. In selected cases, this digital technique allows the production of the final restorations prior to preparing the teeth, eliminating the need for provisional restorations, and reducing appointments and chair time.

2 | TECHNIQUE

The First Fit system allows two different workflows—a one-step approach and a two-step approach. In the one-step, the final restorations are produced prior to preparation of the teeth for veneers and, as a result, no provisional restorations are required. This approach is indicated whenever a feather-edge/vertical preparation can be used and in semi-additive cases. [23,24] This means cases where one can add volume on the interproximal and cervical areas, since the system does not allow the guided preparation on those areas nor a defined finish line.

In the two-step approach, the reduction guides are used to help the incisal and facial preparation and the interproximal and cervical preparation are finished freehand. Meaning the clinician can define finish lines according to his or her preference and the case indications. For example, in discolored teeth, which require cervical preparation or any other case, which demands interproximal reduction, a finish line is mandatory. Traditional impressions can then be made and sent to the laboratory or the preparations can be scanned with a digital intraoral scanner and sent digitally to the technician. 3D-printed or milled provisional veneers that have been previously produced based on the planned digital preparation can then be relined and cemented with flowable composite to allow the patient to have normal function while the restorations are fabricated at the laboratory. In the second phase, the final restorations are cemented in the usual way.

3 | CASE 1

A 29-year-old female patient presented for an esthetic consultation. A comprehensive examination that included periodontal and occlusal analysis was completed. In addition, dental impressions together with photographic and video documentation were collected for a full orofacial analysis and treatment planning purposes. At this time, the treating clinician did not have access to digital intraoral scanning systems.

The esthetic evaluation showed, among other things, an inverted incisal curve, a diastemata, stained canines, and virtually no tooth display at rest (Figure 1). Traditional polyether impressions (Impregum

FIGURE 1 Pretreatment patient presentation—inverted incisal curve, diastemata, stained canines, and virtually no tooth display at rest

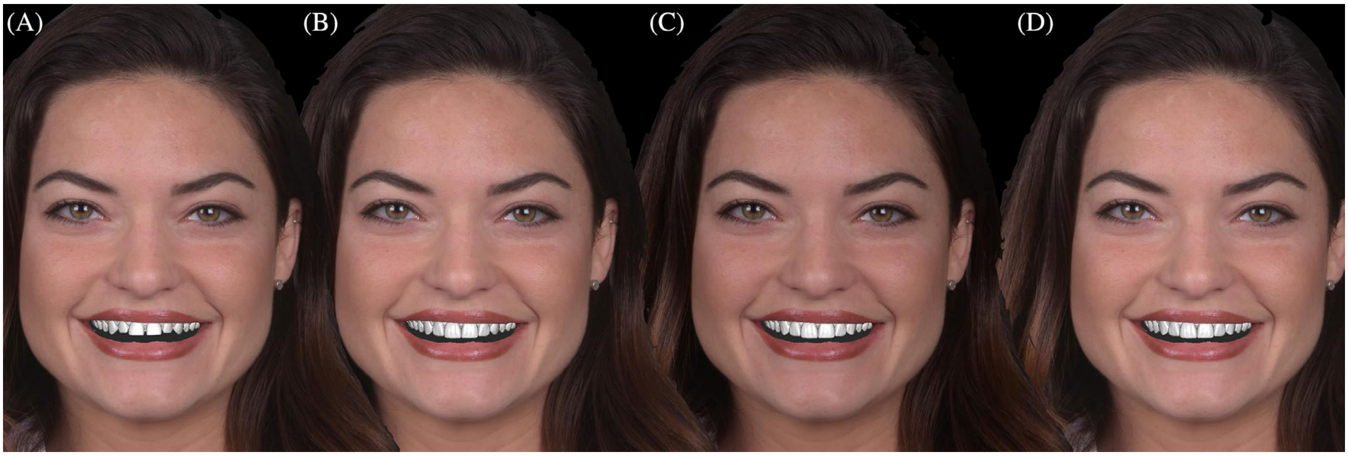

FIGURE 2 A, Preoperative; Three digitally designed wax-ups were digitally designed: B, from maxillary lateral to maxillary lateral; C, from maxillary canine to maxillary canine; D, from maxillary second premolar to maxillary second premolar

FIGURE 3 Motivational mock-up—The patient chose the third option which entailed 10 veneers

FIGURE 4 A light enameloplasty was performed on the interproximal areas of right maxillary lateral incisor to left maxillary lateral incisor to improve the path of insertion of the future veneers

3 M ESPE, St. Paul, Minnesota) were made of the upper and lower arch and sent to the laboratory for pouring and scanning of the casts with the 3Shape D2000 (3Shape, Copenhagen, Denmark). From these files, three different wax-ups were digitally designed—the first from left maxillary lateral incisor to right maxillary lateral incisor, the second from left maxillary canine to right maxillary canine, and the third from left maxillary second premolar to right maxillary upper second

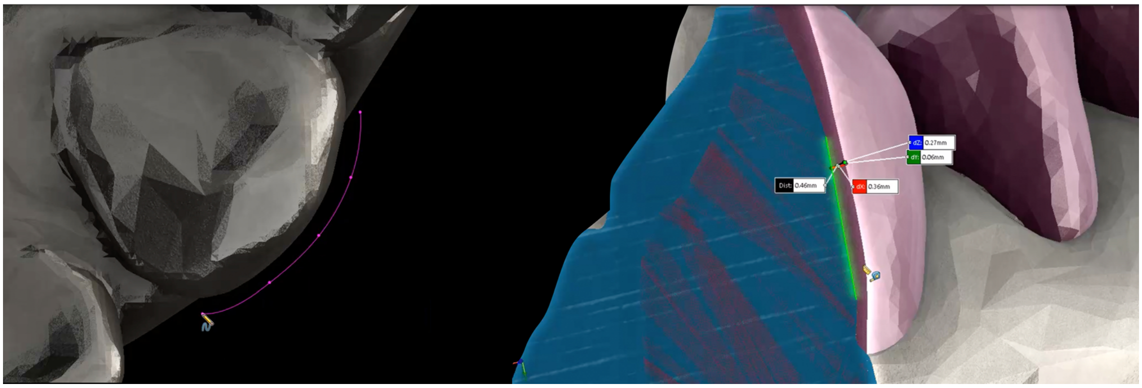

FIGURE 5 First Fit Software generates a model with the ideal proposed tooth reduction taking into consideration the initial 3D digital wax-up

FIGURE 6 3D printed guides for a guided veneer preparation together with the special First Fit handpiece

FIGURE 7 3D printed guide in place intraorally

FIGURE 8 Minimally invasive preparation of teeth with no finish lines

premolar (Figure 2). At the second follow-up appointment, the mock-up was completed using the three wax-ups to show the three different smile design options to the patient. Because the digital workflow makes digital wax-ups more cost effective, clinicians can give patients multiple treatment options before any treatment is started. Photos and videos were shown to the patient so she could choose her preferred smile design (Figure 3). The patient chose the third option, which entailed 10 veneers with a BL3 ivoclar vivadent shade guide.

After the patient validated the smile design and consented to clinical treatment of 10 restorations, a light enameloplasty was performed on the interproximal areas of the right central maxillary central incisor to the left maxillary canine. This was done to improve the path of insertion of the future veneers since the system has some limitations on interproximal preparation (Figure 4). After the enameloplasty, a new polyether impression (Impregum 3 M ESPE) was completed and sent to the lab, along with the digital wax-up file of the design that had been chosen.

The First Fit software created by Viax Dental Technologies (Miami, Florida) considers the initial 3D digital wax-up approved by the patient as the future restoration design to generate a model with the ideal tooth reduction (Figure 5). The software generates the design and sequence of 3D printed guides for guided veneer preparation (Figure 6). A digital veneer is created and, consequently, the final restorations can be designed and produced prior to preparation of the teeth. In this case, the restorations were made in pressable resin, and the final veneers were produced using lithium disilicate ceramic (e.max LT Ivoclar Vivadent, Amherst, New York).

At the third appointment, the teeth were prepared with a specially designed handpiece (Lares Dental Research, Chico, California) unique to the system that engages the guides and allows the clinician to prepare the teeth according to the digital plan (Figure 6). A sequence of six guides was used to complete the minimally invasive vertical preparation using two burs (Mesinger, Centennial, Colorado) and no defined finish line (Figures 7 and 8).

After veneer preparation was completed, each veneer was tried individually to check contact points, esthetics, and marginal fit (Figure 9). Once this step was completed, all the veneers were seated on a model and temporarily bonded into a flexible 3D printed positioning tray made to aid in the manipulation and seating of the restorations. The positioning tray helps hold the veneers in place while the fitting surfaces are etched with hydrofluoric acid (IPS ceramic etching gel Ivoclar Vivadent, Amherst, New York) for 20 seconds. The restorations were then further cleaned with orthophosphoric acid (DeTreyConditioner 36; Dentsply Sirona, York, Pennsylvania) and an ultrasonic bath with isopropyl alcohol for 4 minutes. (Figure 10).

FIGURE 9 Try-in of 10 veneers to check marginal fit and contact points

Triple zero cord (Ultrapack; Ultradent, South Jordan, Utah) was placed in the gingival sulcus. The teeth were then etched with orthophosphoric acid (DeTreyConditioner 36; Dentsply Sirona, York Pennsylvania) for 15 seconds and rinsed for 15 seconds, after which Prime & Bond Active (Dentsply Sirona) was applied over the prepared teeth and light-cured for 15 seconds according to the manufacturer's instructions.

Light-cured resin cement (Calibra Veneers Light; Dentsply Sirona) was applied inside the veneers, and all the veneers were seated in position at the same time with the help of the positioning tray (Figure 11). Once in place, all the excess material was removed with a

FIGURE 11 Etched teeth prior to seating of positioning tray with the veneers attached inside

FIGURE 12 Veneers cemented and final result

FIGURE 10 Positioning tray with veneers in situ being etched and conditioned

fine brush. Each veneer was spot cured to allow the removal of excess cement without causing displacement. After definitively light curing each veneer, the positioning tray was then removed and Liquid Strip glycerin gel (Ivoclar Vivadent, Amherst, New York) was applied to the margins to allow polymerization of the oxygen-inhibited layer.

All the interfaces were cleaned with a curette and a No. 12 scalpel blade, and the interproximal excess was removed with a Ceri Saw (DenMat, Lompoc, California) and dental floss. Finally, the margins were polished with a contra-angle rubber bur (Optra Fine Ivoclar Vivadent, Amherst, New York). The occlusion was checked, and radiographs were taken for control purposes. The patient has been followed-up for the last 24 months and reports no problems (Figures 12 and 13).

FIGURE 13 Veneers cemented and final result

FIGURE 16 3D printed mock-up model

FIGURE 14 Pretreatment patient presentation—spacing, an uneven smile, and yellow, irregular shaped teeth

FIGURE 15 Intraoral pretreatment scan taken with the Trios 3 by 3Shape

4 | CASE 2

A 30-year-old female patient presented for an esthetic consultation, complaining of spacing, an uneven smile, and yellow, irregularly shaped teeth (Figure 14). A comprehensive examination was completed that included periodontal charting, occlusal analysis, and photo and video documentation. In addition, intraoral scans of the upper and lower arches and a digital interocclusal record were performed. The scans were taken with the Trios 3 intraoral scanner (3Shape, Copenhagen, Denmark). (Figure 15).

The esthetic evaluation showed a diastema, steep smile curve, greater negative space on the patient's left side, and teeth that were shade A3. The case documentation was sent securely and digitally to the Digital Smile Design Planning Center (DSD PC) in Madrid, Spain. A comprehensive orofacial analysis was completed, and a digital mock-up of the proposed new smile was produced, considering the patient's original complaints and ideal smile design parameters. The completed STL files were sent back securely via the DSD PC online portal and then 3D printed in house on the Formlabs 2 3D printer (Formlabs, Sommerville, Massachusetts) (Figure 16).

FIGURE 17 Motivational First Fit mock-up in situ and being used as a guide for the gingivectomy

At the second appointment, the motivational mock-up was completed utilizing a silicone index taken from the printed model and Luxatemp Bisacryl (DMG American LLC, Ridgefield Park, New Jersey) temporary restorative material (Figure 17). Photos and video were taken and shown to the patient along with options for treatment, which included a combination of orthodontics and cosmetic composite bonding after teeth whitening. A second treatment plan option included teeth whitening, orthodontics and porcelain veneers substituted for composite bonding. The patient was happy with the mock-up design and after discussion of the advantages and disadvantages of all treatment options chose 10 veneers that would be mostly additive in nature.

The patient's gingival health was checked before gingivectomy was performed, as denoted in the design plan, with a No. 12 scalpel (Swann Morton, Sheffield, England) from the maxillary right first premolar to the lateral incisor and from the maxillary left lateral incisor and first premolar under local anesthetic. This occurred after sounding of the underlying bone (to ensure the biologic width would be respected posttreatment) to standardize the gingival margins on both sides and have similar tooth width to length ratios in the final restorations (Figure 17). At a quality control appointment 1 week later,

FIGURE 19 3D printed provisional restorations

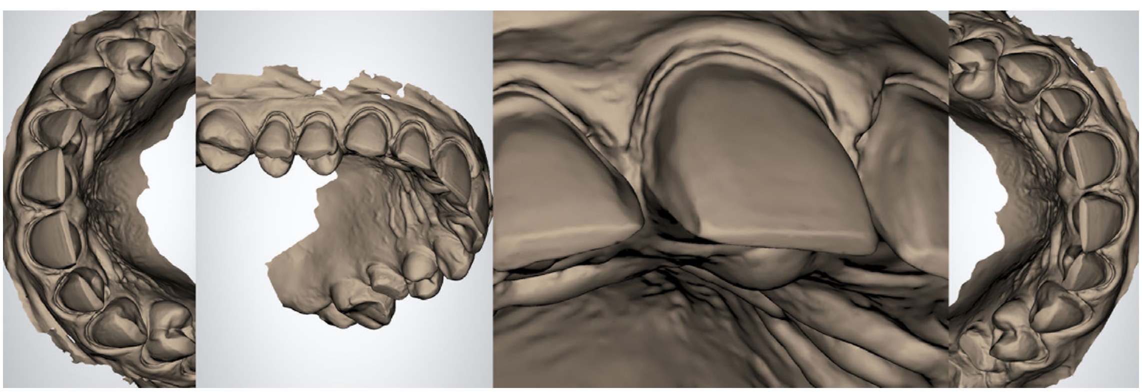

FIGURE 18 Intraoral scans of the preparations with margins taken with Trios 3 by 3Shape

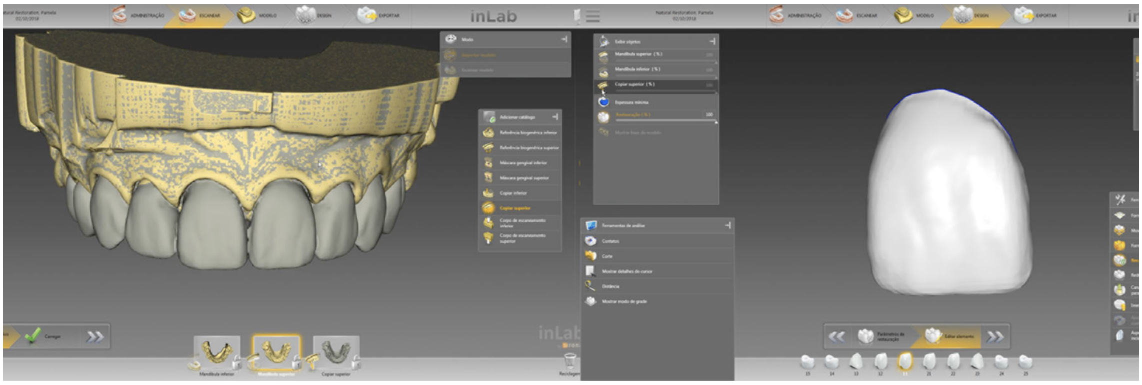

FIGURE 20 Digital design of the veneers over the preparations based in Inlab 18

FIGURE 21 Final result with veneers in place

intraoral photographs were taken to ensure the gingivectomy had been carried out to the planned levels. In addition, a new intraoral scan of the upper arch was taken using Trios 3 (3Shape, Copenhagen, Denmark) and sent to the DSD Planning Center. The digital wax-up was then adjusted to take into account the slight change in gingival levels and sent to Viax Dental Technologies.

As in the first case, the software considered the initial 3D digital wax-up approved by the patient as the future restoration design to generate a model with the ideal proposed tooth reduction. Based on this model, the software generates the design and sequence of the 3D printed guides for guided veneer preparation (Figure 6). In this case, however, unlike the first case, the veneers were not prepared prior to preparation of the teeth but rather fabricated after reduction of the teeth in the traditional way most veneer cases are completed.

At the fourth appointment, the teeth were prepared with the same specially designed handpiece used in the first case (Figure 6). A sequence of eight guides was used to complete the minimally invasive preparation using two burs to give a vertical preparation. Thereafter, the interproximal areas and finish lines were prepared without guides. Tissue control was achieved using a double retraction cord technique—first Siltrax braided cord infused with aluminum sulfate, followed by packing with size 7 cord (Pascal International) and then the epinephrine-infused variety size 8 cord (Pascal International, Bellvue, Washington), which was removed prior to scanning. The preparations were scanned with the Trios 3 and sent to the DSD Planning Center via 3Shape Communicate (Figure 18). A photograph of the substrate with an included shade guide was sent to the laboratory together with the chosen shade tab of BL3. 3D-printed provisional restorations previously produced following the shape of the approved design (Asiga Max printer; Asiga, Alexandria, Australia, with Detax resin, Ettlingen, Germany) and according to the planned digital preparation were then relined and cemented with flowable composite (IPS Empress direct flow Ivoclar Vivadent; Ivoclar Vivadent, Amherst, New York) to allow the patient to function normally while the final restorations were being made (Figure 19).

The DSD Planning Center merged the original design with the preparations, and the restorations were created with Inlab 18 (Dentsply Sirona) at the DSD Natural Lab in Sao Paulo, Brazil. They were milled at the lab with the MCXL milling machine and finished with light polishing and glazing (Figure 20). The material used was monolithic e.max LT (Ivoclar Vivadent).

At the fifth appointment 2 weeks later, the 3D printed provisional restorations were removed, the prepared teeth were cleaned with a slurry of flour of pumice and water, and then each veneer was tried individually to check if the marginal fit and contact points were clinically acceptable.

Once the try-ins were finished, all the veneers were etched with hydrofluoric acid (Ivoclar Vivadent, Amherst, New York) for 20 seconds. The restorations were then further cleaned with orthophosphoric acid (Ivoclar Vivadent, Amherst, New York) and placed in an ultrasonic bath with isopropyl alcohol for 4 minutes.

Size 7 Sitrax cord (Pascal International) was placed, and then a split rubber dam was used to isolate the area. The teeth were then etched with orthophosphoric acid (Ivoclar Vivadent) for 15 seconds and rinsed for 15 seconds. Silane in the form of Monobond S (Ivoclar Vivadent) and then Adhese Universal (Viva pen; Ivoclar Vivadent) was applied over the prepared teeth according to the manufacturer's instructions. Each veneer was then applied with adhesive resin before seating.

Light-cured resin cement (Variolink Esthetic LC Neutral; Ivoclar Vivadent) was applied inside the veneers, which were then seated in position and cemented individually. Once in place, the excess material was removed with a fine brush. Each veneer was spot cured to allow removal of the excess cement without causing displacement. After definitively light curing each veneer, a final cure was done using Liquid Strip glycerin gel (Ivoclar Vivadent), which was applied to the margins to allow polymerization of the oxygen-inhibited layer.

All the margins were cleaned with a curette and a No. 12 scalpel (Swann Morton, Sheffield, England), and the interproximal excess was removed with a scalpel and dental floss (Oral B, Procter and Gamble, Cincinnati, Ohio). Finally, the margins were polished with a contra-angle rubber bur. The occlusion was checked, and oral hygiene instructions and maintenance instructions were given. The patient was clinically followed for 6 months and reported no problems (Figure 21).

5 | DISCUSSION

The veneer guided prep system presents some advantages compared to the conventional method of tooth preparation for veneers, especially a reduction in chair time for both the one-step and two-step workflows. When we compare the conventional method with the guided veneer preparation, the first two visits, diagnosis, documentation, and a diagnostic wax-up and mock-up, are similar to what is described in both of the cases presented here. However, in the one-step approach, since the veneer preparation and the cementation are done in the same day, it allows to reduce the number of appointments, besides the guides allow a faster preparation since they are fully guided. In addition to streamlining the preparation process, only one appointment was needed to complete the work since the veneers were manufactured prior to tooth preparation and cementation occurred at the same visit (compared with the two visits traditionally required for preparation and then subsequent cementation).

In the two-step approach the advantage of the system allows the reduction of the preparation time of the facial and incisal surfaces. The 3D-printed guides allow reduction of enamel in a controlled and preplanned way, which requires less decision-making by the clinician regarding how and where to perform tooth preparation. The unique handpiece and guides of the First Fit system allow teeth to be reduced to a preplanned depth and required area, in contrast to the use of calibrated burs or silicone guides, which require stopping to re-evaluate the preparations during the procedure.

Andrade et al introduced the concept of the ultimate laminate veneer wherein the lab technician fabricates individual resin guides, thereby guiding the preparation of the veneer on the cast. With the same resin guides, the clinician can reproduce the preparations done on the stone model in the patient's mouth. The aim of this concept is similar to that of the First Fit system, where the aim is to guide veneer preparation, be as conservative as possible with the preparation, and, in semi additive cases, produce the veneers in advance and thus deliver the restorations on the same day as tooth preparation. While the purpose is similar, the First Fit guides allow a high degree of precision as the handpieces engage the guides and can be moved only in the desired direction.[14]

A major benefit of both the one- and two-step techniques is a guided preparation that allows minimally invasive reduction of the tooth structure in a controlled and precise manner. Because of the guides, the reduction is less dependent on the many varying factors of traditional techniques. One of these factors is the flexibility of silicone. When doing a mock-up and preparing the mock-up, the flexibility of the matrices can make the mock-up overly thick or thin, reducing its accuracy. In addition, the mock-up can dislodge during preparation, making it difficult to know exactly where the tooth structure should be reduced.

The one-step approach requires a vertical preparation with no defined finish lines, which is why it is indicated mainly for semi-additive cases. The system cannot guide preparation in these areas, but this can be overcome by reshaping these areas prior to taking impressions, as in the first case. Alternatively, when small amounts of enamel preparation are needed, a two-step approach can be adopted. Vertical preparation has been tested in vitro and in vivo with high-strength ceramics and lithium disilicate for full crowns and veneers with marginal fit similar to conventional preparation and survival rates over 95% from 4 to 12 year.[15-25]

Vertical preparation can be a limitation for nonadditive cases or when the color substrate is unfavorable, which requires subgingival preparations to increase ceramic thickness at the margins. However, it also presents some advantages, namely that the lab technician and clinician have the freedom to choose where they want the restoration margin. Further, the minimally invasive nature of the preparation technique means that enamel can be saved in the cervical region where it is generally thinner.[15,24,25] While no difficulties were experienced in either case with using the 3D-printed guides, glycerin gel is recommended to aid lubrication and minimize any friction between the guide and the handpiece.

The one-step technique can be used in selected cases where the interproximal areas and cervical thirds of the teeth to be restored require little or no preparation, which means it is ideal for completely additive cases. In some instances, as demonstrated in the first case, light enamel reshaping can be done prior to the impression or digital intraoral scan used to produce the guides, allowing the case to be completed in one-step.

In the first case, the restorations were produced before preparation and, as a result, special attention was taken to assess the fit of the veneers. They were tried individually with ×4 magnification loupes and confirmed to be clinically acceptable and conforming to standards used to judge traditionally produced and cemented veneers. More study is needed and ongoing regarding marginal and internal fit.

The positioning tray used to keep the restorations in place and seat them simultaneously in case 1 was helpful during etching of the porcelain and application of the silane. The flexibility of the positioning tray allowed it to be easily opened if needed while seating the veneers. This part of the technique requires training so that the restorations can be adequately cleaned and cemented all at once while respecting the periodontal tissues. Spot curing is recommended to allow the clinician to clean the excess with a fine brush before definitive curing. This type of tray can also be used with rubber dam if required.

In case 1, no provisional restorations were needed, which brings great value to both the patient and the clinician. On the clinician side, chair time is reduced, along with the liability of a patient leaving the office with temporary restorations. Patients can go about their lives with no downtime and can eat normally.

In case 2, 3D printed provisional restorations relined with flowable composite and spot etched were used. Having the shell temporaries ready prior to preparation reduced chair time during the preparation appointment and during provisional fabrication. Further, the 3D-printed provisionals exactly follow the shape and contour of the proposed final restorations since they are made utilizing the design approved by the patient during the mock-up. This allows the patient to get used to the shape of the definitive veneers yet to be cemented.

Case 2 utilized intraoral scanning to design the case and record the preparations. Proper scanning technique following the scan path recommended by the scanner manufacturer and control of the tissues prior to scanning are essential for accurate results.[16] The production of veneers that follow natural imperfections in terms of shape, texture, and morphology requires digital technicians that can adapt the preliminary mock-up design to preparations that respect form, function, and biology. Finally, tailored milling strategies and finishing protocols were employed that can produce exquisite monolithic restorations rivaling any produced by traditional methods.[23]

6 | CONCLUSION

The veneer guided prep system allows minimally invasive, digitally guided veneer preparation. In some cases, it enables the application of veneers at the second appointment, alleviating the need for provisional restorations. Some of the system's limitations can be overcome with the two-step approach, which has the advantage of digitally guided preparation that can potentially increase accuracy, efficiency, and predictability while reducing patients' chair time. The techniques discussed in this article require additional costs from the purchase of a new handpiece and the production of 3D-printed guides that are fabricated by a laboratory. However, the ability to utilize digital technology to improve clinical outcomes and reduce errors in preparation design and the treatment workflow are major benefits for all parties involved in the dental veneer process.

DISCLOSURE OF INTERESTS

The authors do not have any financial interest in the companies whose materials are included in this article.

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