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Direct Veneer

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Dentistry in Partial Fulfillment for the Bachelor of Dental Surgery.

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

{ يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ
دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ }

سورة المجادلة ، آية : 11



Certification of the Supervisor

I certify that this project entitled " **Direct veneer** " was prepared by the fifth-year student " **Hiba Amer Abd Al-Rahman** " under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Supervisor's name

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Dedication

*To the example of devotion and sincerity my beloved father,
to whom I gave my happiness and comfort to her happiness
my virtuous mother and to my dear family and to all those
from whom I received advice and support I present to you
the summary of my scientific effort.*

Acknowledgement

First of all, Great thanks to God for inspiring me the strength and willingness to complete this study, and I pray that his blessing upon me continue throughout my life.

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Introduction

Facial aesthetic plays an important role on an individual's well-being, self-esteem, emotional condition, social success and even chances to get a job. The smile is primordial in the search for an optimum dentofacial aesthetic standard. An aesthetic smile depends on the harmony of shapes and shades of anterior teeth. In addition, the alignment of these teeth and their harmonic positioning on the arch are the basics to obtain this aesthetic balance (Busato, Hernandez, et al., 2002; Kina and Bruguera, 2008).

However, teeth are not always distributed on a harmonic way on the dental arch. This lack of harmony may have different origins, such as genetic or developmental tooth anomalies, structural changes caused by caries and chromatic changes or injuries in the dental structure due to trauma. When these alterations take place on the labial surface of anterior teeth or even on the buccal surface of premolars, one treatment option can be the total covering of the surface using a restoration called a laminate, veneer or facet. This restoration is used to cover an unsightly area by bonding to the facial surface of the prepared tooth (Ho GW and Matinlinna, 2011).

A veneer is a layer of tooth colored material that is applied to a tooth to restore localized or generalized defects and intrinsic discolorations (Andre, lee W., et al., 2018). They are frequently used to improve aesthetic by modifying the color, shape or position of a tooth (Ireland RA., 2010).

Typically, veneers are made of directly applied composite, processed composite, porcelain or pressed ceramic materials (Andre, lee W., et al., 2018).

Currently, nanofiller composites are not only time and cost-effective, but they are also ultimately a high-quality and long-lasting treatment of choice (Ferracane, 2011; Eltahlah, Lynch, et al., 2018).They present superior strength, excellent physical and optical / color properties and improved polishing characteristics compared with early macrofills, which allow composite resins to be successfully used in stress-bearing and esthetic areas (Ferracane, 2011).

This allows clinicians to perform artistic restorations, which can mimic the natural dentition and can equal or even surpass dental ceramics (Rosentritt, Sawaljanow, et al., 2015; Dietschi, Ardu, et al., 2006).

Direct composites are currently used for treating poor esthetics in anterior teeth presenting unsatisfactory color and shape, defective restorations, slight misalignment and fractures. Direct composite veneers are applied directly on prepared tooth surfaces with a composite resin material and in some cases, there is an absence of tooth preparation (Korkut, Yanıkog̃lu F, et al., 2013).

However, placing a direct veneer in a naturally aesthetic manner requires an understanding of different thickness of dentin and enamel in different parts of the tooth. Proper composite material selection along with proven polychromatic layering techniques, this could enable the clinician to deliver direct restorations more confidently and predictably (Milnar, 2009; Kevin, 2018).

Aims of the study

The aim of this literature review is to discuss the necessities of direct composite veneers for the ultimate success and illustrates how to perform a minimally invasive, long lasting, functional and natural alike smile makeover with composite restorations in a single visit.

Chapter one
Review of literature

1. Indications:

1. Discolorations of teeth or restorations.



Figure.1, A) The maxillary right central incisor exhibits bright intrinsic yellow staining as a result of calcific metamorphosis. B) direct-composite veneer reduce brightness and intensity of stain and simulate vertical areas of translucency (Andre, lee W., et al., 2018).

2. Dental malformations or mal-positions.

3. Diastemas, crown fractures.



Figure.2, A) Diastema closure and cosmetic contouring. B) Significant esthetic improvement is achieved by replacing defective Class III restorations and closing diastemas with conservative composite additions and cosmetically reshaping teeth (Andre, lee W., et al., 2018).

4. Abrasive or erosive defects.
5. Enamel hypoplasia (developmental malformation generally resulting in poor aesthetics, tooth sensitivity, malocclusion and predisposition to dental caries)
(Terry, leinfelder, et al., 2010).
6. Underdeveloped teeth, such as a peg lateral.



Figure.3, Peg lateral incisor.

2. Contraindications:

1. Contraindications include limitations. One must be very aware of the limitations that prevent the opening of the bite for one reason or another. The best way to evaluate whether it is possible is to add some composite incrementally to the posterior dentition. A night guard also opens a patient's bite. Then the patient can determine if he or she is comfortable in that raised vertical position.

2. Contraindications to using direct composite bonding include gross loss of tooth structure where composite would not be strong enough. In these cases a porcelain, crown or veneer may be more suitable.

3. A grossly decayed or brittle teeth or poor oral hygiene are also negative indicators. With poor hygiene it is difficult to maintain the margins and decay will reoccur (Terry, leinfelder, et al., 2010).

3. Advantages:

1. The more conservative option very little preparation is needed for a direct composite resin veneer because composite resin can be made to be very thin in areas due the fact that it is built directly on the tooth structure (Nash, 2012).

2. Non-invasive (Terry, leinfelder, et al., 2010).

3. Its low cost, that the restoration may be evaluated as a reversible treatment procedure and the restoration can be repaired intraorally (Magne, 2003).

4. Disadvantages:

1. Composites can stain, chip and lose luster. They are also very technique sensitive, the dentist must be adept and very detail oriented to achieve a successful result. It is necessary to polish composites to establish a superficial layer that replicates the glaze of natural tooth structure. Polishing is also important to avoid future staining.

Stain can accumulate in days or weeks from normal food intake. Patients are advised to not drink or eat anything that may stain the composite for about 2 days after treatment because the composite is slightly porous (Freedman, 2011).

2. Microleakage, low abrasion resistance and plaque accumulation so they are more appropriate to use for anomalies limited with enamel and as provisional restorations (Freedman, 2011).

5. Direct Veneer Technique:

5.1. Direct Partial Veneers.

Partial veneers are indicated for the restoration of localized defects or when there is localized discoloration and entire facial surface is not involved.

Technique: (Andre, Lee W., et al., 2018; Nisha and Amit, 2020)

- Preliminary steps include cleaning, shade selection and isolation with cotton rolls or rubber dam.
- Anaesthesia usually is not required unless the defect is deep, extending into dentin.
- The outline form is dictated solely by the extent of the defect and should include all the discoloured area.
- The clinician should use a coarse, elliptical or round diamond instrument with air-water coolant to remove the defect.

- Fill the defect with microfilled composite after etching and application of bonding agent.



Figure. 4, A and B / Partial direct veneer of maxillary incisors (Nisha and Amit, 2020).

5.2. Direct Full Veneers

Are indicated in following cases:

1. Diastema closure.
2. Tetracycline stained teeth.
3. Improper contours and shape of teeth.
4. Grossly stained and pitted teeth.
5. Gross enamel hypoplasia of anterior teeth.

Technique:

- Perform oral prophylaxis and select the shade. The area is isolated with cotton rolls and retraction cords.
- Reduce 0.5–0.75 mm of enamel mid-facially and 0.2–0.5 mm along the gingival margin. Give chamfer finish line for definite cavity margins. At the proximal side, preparation should be facial to the contact point.
- Do acid etching, washing and drying followed by application of bonding agent.
- Place composite in increments. When adding composites, care should be taken to create proper physiological contour, contact point and smooth surfaces.



Figure. 5, Direct full veneers using light-cured composite for defective veneers. A) Defective composite veneers with marginal staining. B) conservative intra-enamel preparation. C) new direct composite veneers on maxillary anterior teeth (Andre, lee W., et al., 2018).

6. Simple direct veneers:

With the development of modern composite materials, it is possible to make natural-looking direct veneers without resorting to difficult layering strategies. The advantage to this approach is we do not have to select many different shades, and then pay meticulous attention to their layering thickness. This decreases the chance for errors and mismatches, hence we can concentrate on creating a natural shape and polishing. This simple technique is also indicated in the case of large defects. As the thickness of the body material is decreasing, the material appears less chromatic and more translucent, making it suitable to replace dentin, and also palatal and approximal parts of the tooth with the same shade. If however, there is insufficient space for this kind of materials, they can become too translucent in the dentin area and drop the value of the restoration. The following figures (6-25) illustrating the techniques of simple direct veneer (Janos, 2023).



Figure.6, Initial situation of this young female patient, who presented with improper old composite restorations on teeth 11 and 21.



Figure.7, Full status of the patient.



Figure.8, After discussing all possibilities and initial periodontal and conservative therapy, we decided to replace the restorations with composite resin. We took an impression and have a conventional wax-up fabricated for the two central incisors.

Tip No.1 / Make sure to remove all vestibular and palatal overhangs of old restorations before the actual impression. This makes it possible for the lab technician to create proper shapes and gives you better fitting silicone keys. Furthermore, it lets the gingival inflammation heal and you will be able to make the new restorations in better conditions.



Figure.9, Try-in of the selected body and enamel shades on the adjacent teeth before dehydration of the teeth, right after anesthesia.



Figure.10, Placement of rubber dam, removal of old restorations and creating a 1.5 mm long bevel on the vestibular side for an invisible transition between tooth and restoration. In cases where you cover the whole buccal surface of the tooth with composite, it is easier to create a nice transition.



Figure.11, Make sure to try the silicone key with the rubber dam in place, to ensure a perfect fit without interferences.



Figure.12, Marking the finish line with the LM Arte Fissura instrument.



Figure.13, This makes the extent of the missing palatal side evident.

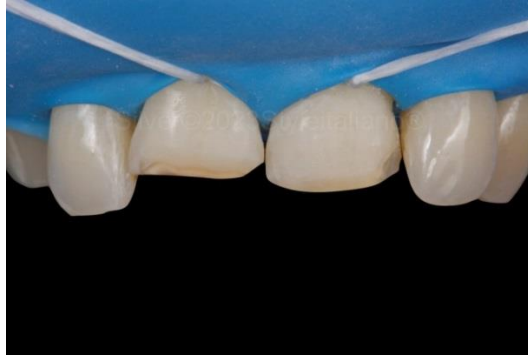


Figure.14, In case of a medium scalloped gingival architecture, you can achieve sufficient retraction with floss ligatures. After this, the surface was sandblasted with 30micron Al₂O₃ (AquaCare).

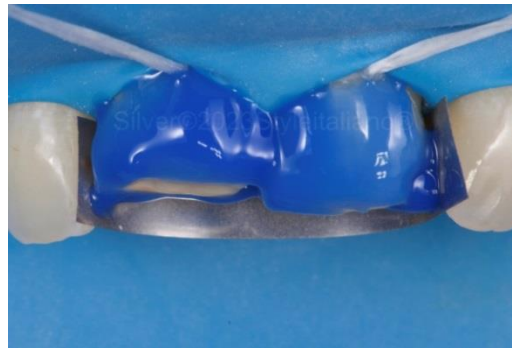


Figure.15, Etching of the enamel for 30 seconds.



Figure.16, Creation of the palatals shells.

Tip No.2 / Body shade material was used for both the palatal and interproximal layers due to its good handling and optical properties.



Figure.17, For the creation of the approximal walls, Unica matrix was used. You can also use this matrix for gingival retraction and support for cervical composite layer.



Figure.18, Approximal walls in situ. As we use the same material for the dentinal body, thickness of the material is not important here.



Figure.19, Placement of the dentine body with body shade. The mamelon architecture is extended almost to the incisal edge, as there is not much incisal translucency in the adjacent teeth. Towards the gingival side, the material is extended to the whole bevel, to ensure even thickness of enamel material.



Figure.20, A flowable opalescent effect material is placed in the incisal part.



Figure.21, The enamel layer is placed on the whole labial surface.



Figure.22, Final polymerization with Liquid strip (Ivoclar), to prevent the formation of the oxygen-inhibition layer.



Figure.23, The transition lines define basic shape and symmetry of the teeth.



Figure.24, After polishing.



Figure.25, Final restorations after rehydration. For direct restorations, light bouncers or softboxes can hide the real appearance, so a regular twin flash will give a more realistic picture of the end result.

7. Direct – indirect composite veneer technique:

The direct – indirect composite veneer technique was introduced in the 1990s as a means to heat-temper composites in partial and full veneers (Birnbaum, 1992, 1994 ; Fahl, 1996).

A direct-indirect restoration is one in which the composite resin is sculpted directly on the tooth structure without previous adhesive preparation, light activated, removed from the tooth, heat tempered, finished and polished extraorally, and finally “bonded” or adhered indirectly in the mouth in a single appointment.

In fact, the technique comprises several important requirements for each of the steps and may present slight variations depending on the clinical procedure. Also called semidirect (Fahl and Ritter, 2020).

From a dental materials standpoint, the main advantage of this approach over a directly placed composite veneer is the enhanced physical and mechanical properties afforded by the extra- oral chairside tempering process due to increased monomer conversion. From an operator standpoint, the technique affords greater operator control over the final marginal adaptation, surface finishing and polishing and anatomy of the restoration, given that these elements are created outside of the patient’s mouth.

Finally, the direct – indirect technique is more comfortable to patients, since many of the restorative steps involving rotary instrumentation, particularly margin finishing occur extra- orally.

Techniques: (Fahl, 2015)

1. Shade selection.
2. Apply a light – cured composite material to the tooth, with or without tooth preparation, without any adhesion.
3. The composite is then shaped to a primary anatomic form with slight excess and then light – cured.
4. After that, the partially polymerized restoration is carefully removed from the non- retentive, non- bonded tooth surface, heat- tempered extra- orally chairside and finished and polished to final macro and micro anatomy.
5. Shade try-in.
6. After shade try-in and confirmation of the overall fit and esthetics, the veneer is bonded to the preparation using a resinbased luting agent.

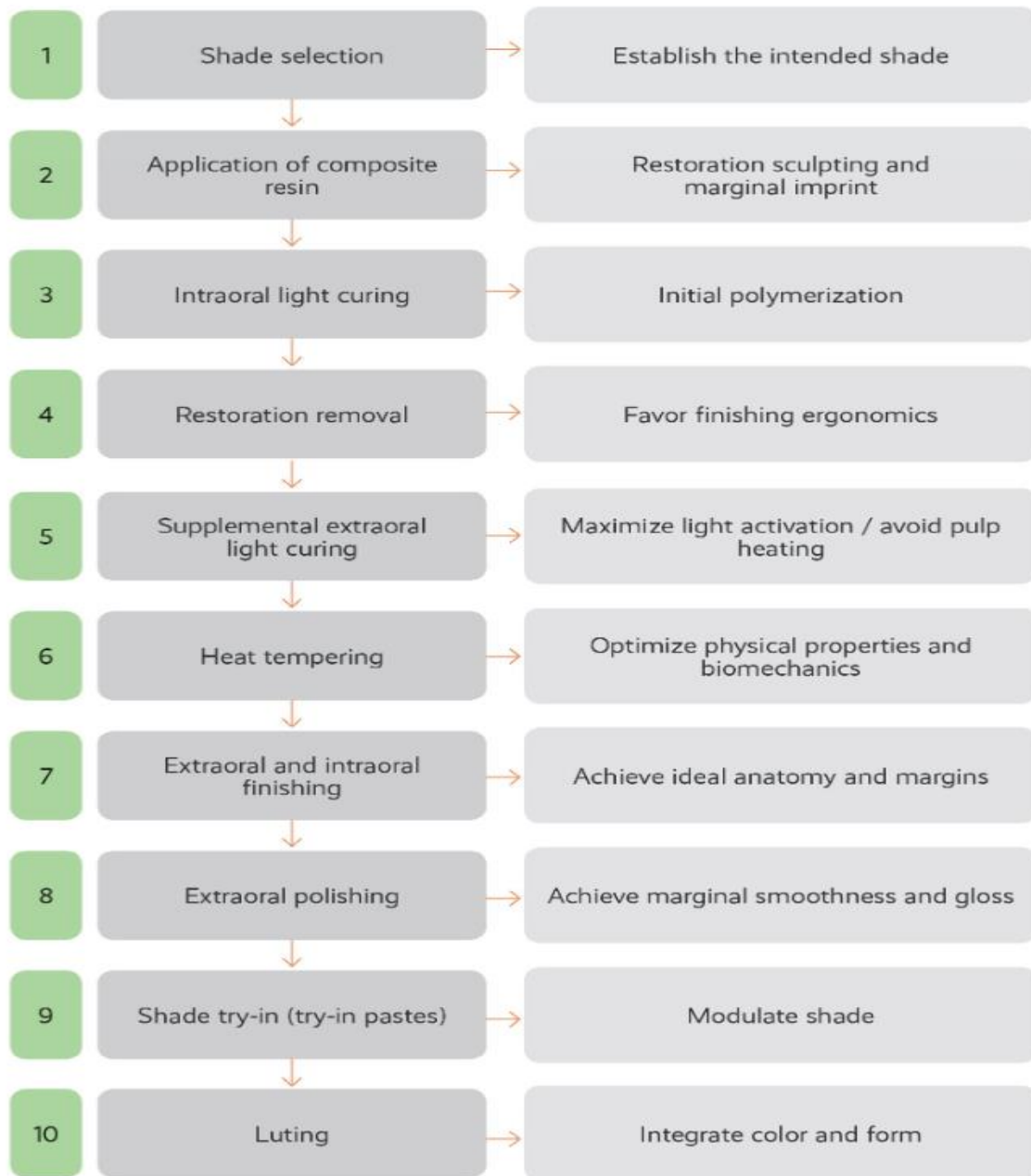


Figure.26, Steps for Direct – indirect restorations (Fahl and Ritter, 2020).

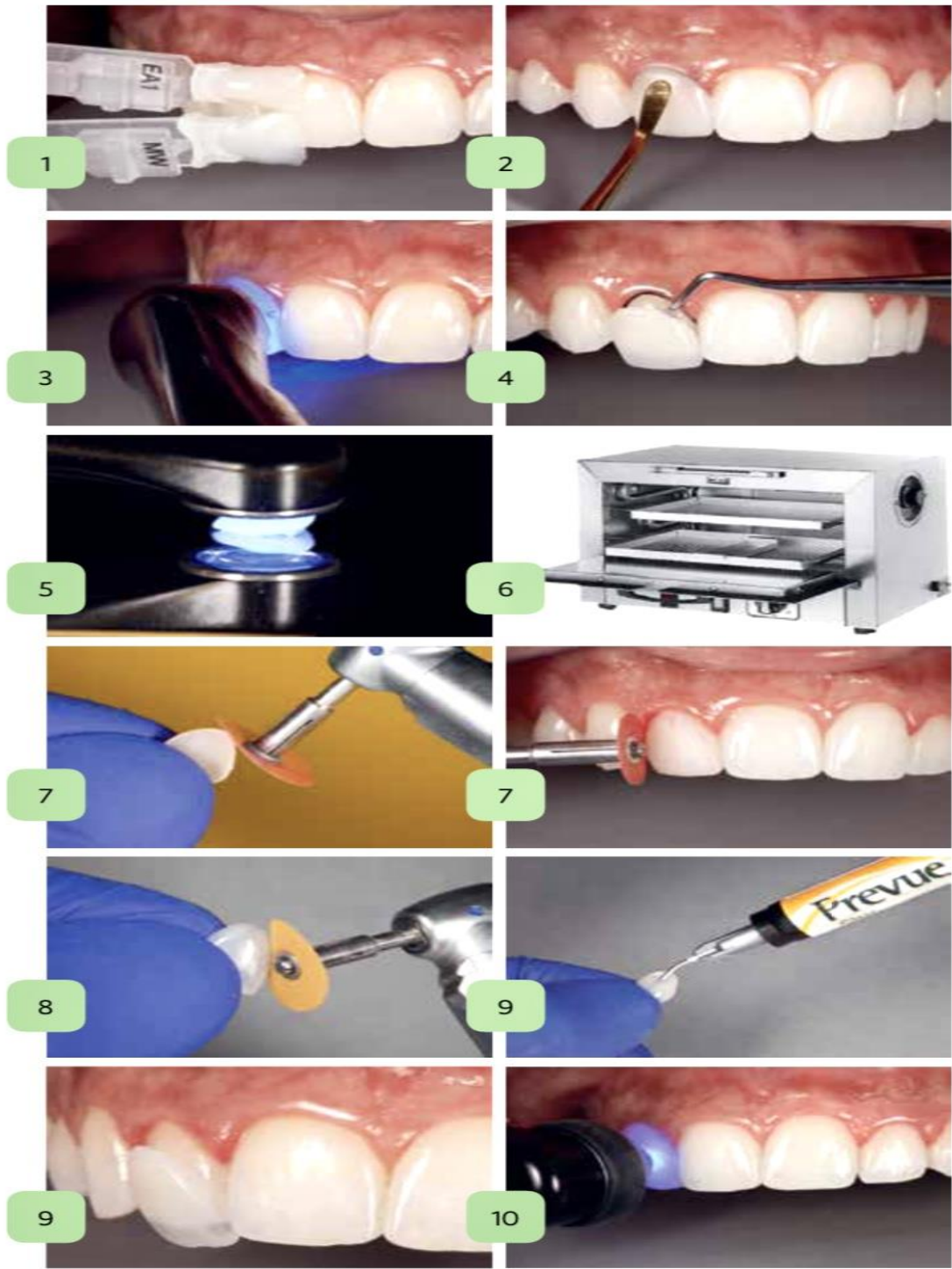


Figure.27, Direct-indirect techniques (Fahl and Ritter, 2020).

8. The injectable composite resin technique:

In modern dentistry, silicone indices are extremely useful for restorative procedures from the planning phase through the tooth preparation and final restoration phases.

The injectable composite resin technique is an indirect / direct method that uses a transparent silicone index for accurate and predictable translation of a diagnostic wax-up into composite restoration.

It can be used for definitive restorations as well as transitional restorations for evaluating changes in occlusal parameters over time. Furthermore, it can be used to establish new vertical dimensions, restore fractured or worn dentitions and fabricate provisional restorations (Terry, Powers, 2014; Ammannato, Ferraris, et al., 2015).

Owing to their consistency, flowable composites are preferred over conventional composites for use with this technique, because they can fill the mold under the silicone index without the need for external pressure on the index.

The injection technique using flowable composite is an example of a technique that suggests a quick and simple way to restore contours and shape of worn-out defective teeth (Terry and Powers, 2014). After taking an impression and pouring it with stone, a waxup is made on the model replicating the desired outcome. An impression of this waxup is taken with a clear polyvinyl siloxane (PVS) material. Small access holes are made facially to the incisal edges of the teeth to be restored. Etching and bonding is done for every other tooth while isolating the other teeth with polytetrafluoroethylene tape.

After inserting the PVS mold and checking its proper fit, flowable composite is injected through the access holes for the teeth that have been prepared and photopolymerized. This process is repeated for the other teeth that were isolated and after removing the mold, the final restorations are finished and polished.

Because the PVS mold replicates the complete waxup, the space between the mold and the natural tooth is inevitable and injecting the flowable composite into one tooth space can cause the flowable composite to leak into this space and polymerize on the adjacent tooth. This can be difficult to clean and reshaping the teeth time consuming, diminishing the very purpose of this technique, saving time with a favorable result.

A more accurate approach based on the injection technique is proposed by making a waxup on the cast of every other tooth, then taking an impression with the clear PVS. This will be the first mold. Then the waxup is completed for the other teeth and a second PVS mold is made for the full waxup of the teeth.

After isolation, etching and bonding as previously described, the first PVS mold is secured in the patient's mouth. There should be a tight seal between the waxed and unwaxed teeth to seize the flowable composite from flowing into the embrasures and onto the adjacent teeth, accurately polymerizing the flowable composite into the confined space of the first waxup. The second PVS mold is placed and the process is repeated. Accuracy and finishing time should be advantageous with this approach vs the conventional injection technique.

However, it may be challenging to achieve symmetry, shape and contouring of the teeth. Clinicians and technicians need to consider that it is very difficult to make two identical manual waxups, especially considering that one of them will have waxed every second tooth. Therefore, a digital workflow version of this procedure is introduced in the following clinical case, which can solve the drawbacks mentioned previously.

The present report describes the successful use of this technique, with certain modifications, in a case involving a 22-year-old man with esthetic and function problems associated with multiple diastemas and limited tooth visibility. Technical modifications included the use of individual mock-ups as space holders, gingival retraction cords and cutting of the silicone index at the gingival margin (David, 2019).



Figure.28, Pretreatment findings for a 22-year-old man with diastemas and limited tooth visibility. a) Intraoral view. b) Forced smile.



Figure.29, Pretreatment evaluation of lateral excursion in a 22-year-old man with diastemas and limited tooth visibility. a) Right lateral excursion. b) Left lateral excursion.

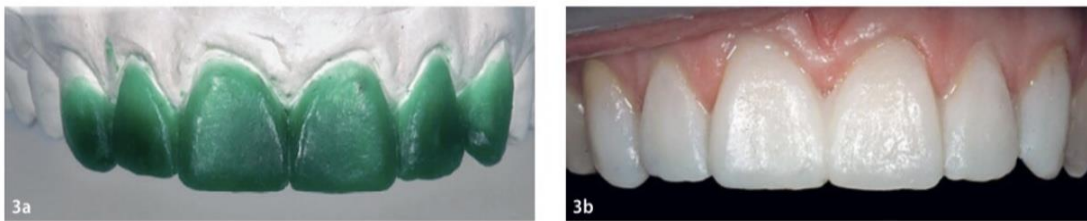


Figure.30, Wax-up and mock-up prepared for treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility. a) Wax-up. b) Mock-up (intraoral view).



Figure.31, Preparation of a silicone index for treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility. An impression of a prepared wax-up is recorded using transparent silicone.

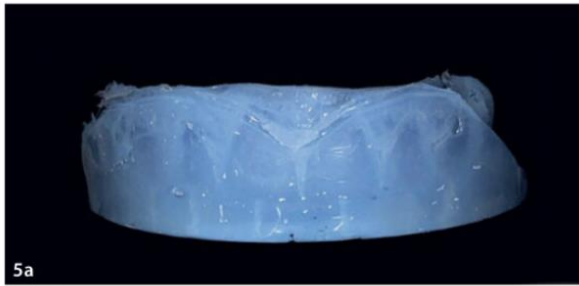


Figure.32, a) Frontal view of a transparent silicone index with holes at the incisal edges, prepared for treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility. b) Separated mock-ups (space holders) prepared for treatment.



Figure.33, Use of individual mock-ups (space holders) and gingival retraction cords during treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility.

a) Placement of the space holder on the adjacent tooth (maxillary left central incisor) and a retraction cord in the sulcus. The maxillary right lateral incisor has already been injected. b) Isolation of adjacent teeth with polytetrafluoroethylene tape.



Figure.34, Injection of flowable composite into a transparent silicone index prepared for treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility.



Figure.35, Final outcomes of the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility. a) Intraoral view. b) Forced smile.

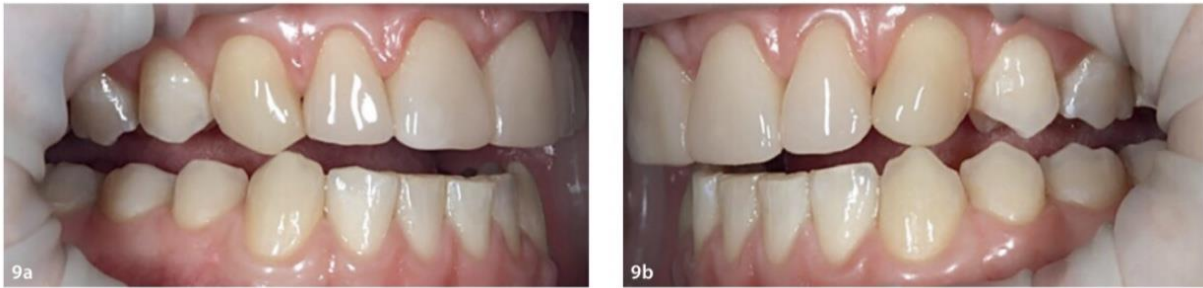


Figure.36, Final outcomes in terms of lateral excursion after treatment with the injectable composite resin technique in a 22-year-old man with diastemas and limited tooth visibility. a) Right lateral excursion at 6 months after treatment. b) Left lateral excursion at 6 months after treatment.

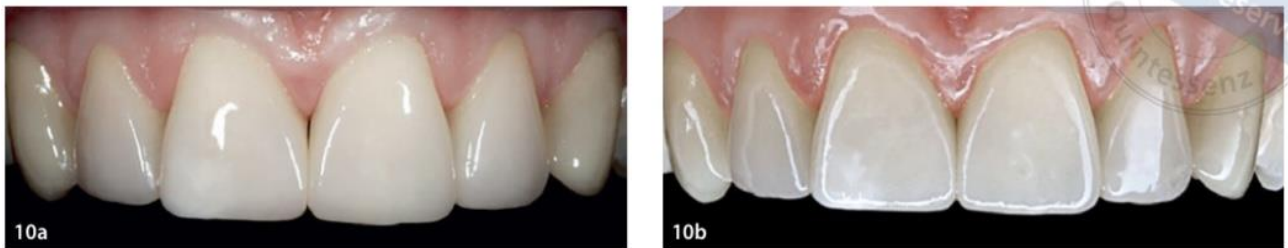


Figure.37, Intraoral findings after treatment with the injectable resin composite technique in a 22-year-old man with diastemas and limited tooth visibility. a) 12 months after treatment. b) 24 months after treatment.

Chapter two
Conclusions

Conclusions

1. Direct composite veneers should be an addition to most dentists repertoire of services for restorative and cosmetic treatments, because with the proper materials and methods they're easier, more predictable and more profitable than ever before.
2. Direct composite veneers are well indicated as an approach to improve tooth color and esthetics. This treatment presents advantages, including satisfactory bonding between resin composite and dental substrate, low cost, less clinical time, and acceptable esthetic results due to the improved optical and mechanical properties of composites.

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