Egyptian Prosthodontic Association (EPA Newsletter)

Injection Flowable Technique

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Introduction

Continuing developments in adhesive technologies, the design of resin composite formulations, and innovative application techniques have revolutionized the delivery of minimally invasive direct resin composite restorations, thereby improving the practice of dentistry. In some cases, achieving optimal esthetic direct resin composite restorations requires utilizing complicated layering techniques that are dependent upon the clinician's skill and artistic ability. The inverse injection flowable technique[1,2] is a unique indirect/direct process of predictably translating a diagnostic wax-up or the anatomical form of the natural dentition of a pre-existing diagnostic model into composite restorations. It offers a simplified, precise, and predictable method for developing natural esthetic composite restorations, while reducing chair time. **Although not a solution to all restorative challenges, this technique provides the patient and clinician with an alternative approach to various clinical situations.**

Clinical Applications

There are a multitude of applications for this technique using a highly filled flowable resin composite. The clinical applications include:

emergency repair of fractured teeth and restorations

1- fabricating, modifying, and repairing prototypes and provisional restorations,3,4 composite restorations (Class III, IV, veneers)[3] and pediatric composite crowns[5]

2- Resurfacing occlusal wear on posterior composite restorations

3- Resurfacing resin composite restorations (Class IV, V, veneers)

4- Establishing incisal edge length prior to esthetic crown lengthening[4]

5-Developing composite prototypes for copy milling[4]

6- fabricating an implant-supported composite provisional

7- restoring fractured or missing denture teeth

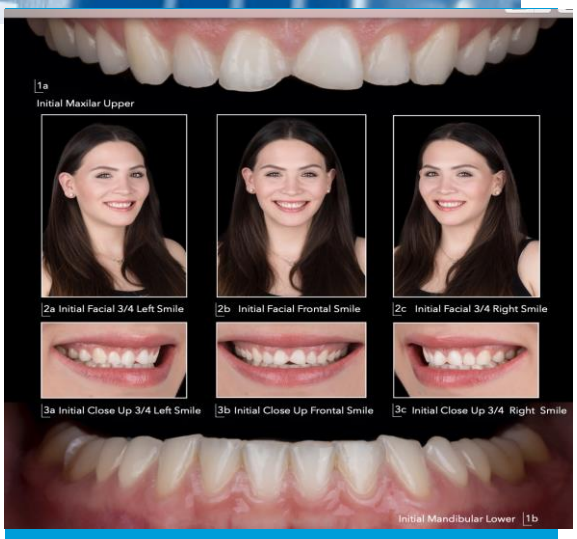


Figure 1: Preoperative facial view and

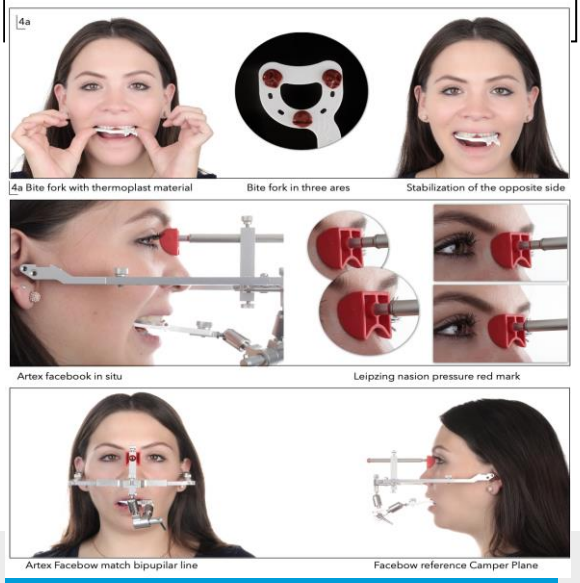
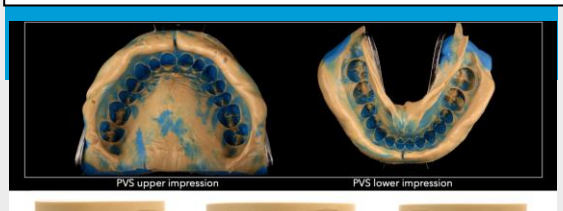


Figure 2: Facebow record.



In addition, the inverse injection layering technique can be used to establish vertical dimension and alter occlusal schemes (anterior guidance and posterior disclusion) prior to restoring with final restorations.[4] Furthermore, this noninvasive technique is an integral tool for enhancing communication between the patient and restorative team during treatment planning.[3]

Developing transitional resin composite restorations using the injectable technique is an excellent way to increase the patient's understanding of the planned clinical procedure and anticipated final result.[6]Transitional composite prototypes allow the patient and restorative team to establish parameters for:

1- Occlusal function[7]
2- Tooth position and alignment[8]
3- Restoration shape physiologic contour[9]

4- Restorative material color and texture
4- Lip profile
5- Phonetics
6- Incisal edge position
7- Gingival orientation.

The inverse injection layering technique can be performed intraorally without anesthesia in some clinical situations. A clear vinyl polysiloxane (VPS) impression material is used to replicate the diagnostic wax-up or the anatomical form of the natural dentition of a pre-existing diagnostic model. The clear matrix can be placed intra- orally over the prepared or unprepared teeth and used as a transfer vehicle for the flowable resin composite to be injected and cured.

The evolution of fluid composites in the last few years have shown that we can achieve lasting results from 3 to 5 years without any failure of adhesion to enamel.

In the following case, we will demonstrate the handling behavior of restorations using injectable flowable composites as follow:

*(Case credit belongs to Dr. Enrique Diaz.) [10]

1- Preoperative facial view and close up of the smile from different aspects for a 30-year-old patient presented with cosmetic concerns regarding his smile. Her requested a conservative esthetic enhancement. (Figure 1)

2- Facebow record, upper and lower impressions using PVS impression material ,cast model fabrication and mounting of the casts on a semi adjustable articulator (artex articulator). (Figure 2&3)

3- Development of a diagnostic wax-up that established new esthetic and functional parameters for the definitive restoration . (Figure 4)

4- A clear vinyl polysiloxane VPS matrix (Exaclear, GC) was fabricated to replicate the diagnostic wax-up using a non perforated tray. (Figure 5)

Figure 4 : diagnostic wax-up that established new esthetic and functional parameters for the definitive restoration

Figure 5: A clear vinyl polysiloxane VPS matrix.

5- A small openings was made above each tooth that was to be restored using a tapered diamond bur (6847, Brasseler USA; Savan- nah, GA). It is important to clean the internal surfaces with a micro brush to prevent silicone debris from becoming incorporated into the flowable material.

6- The flowable composite material used for the injection was a nano filled G-aenial Universal,GC.

7- The primary factors to consider prior to the veneer preparation of any tooth include anatomic variations in enamel thickness according to tooth, and location on the tooth and the definitive restorative dimension. The preparation of this case included a conservative intraenamel reduction of 0.2 mm, with all line angles and corners smoothed and rounded to improve resin adaptation and reduce the potential for stress concentrations in the restoration.

8- Before adhesive surface preparation, each tooth was separated by applying sterilized Teflon tape on the adjacent teeth. A 37.5% phosphoric acid semi-gel (Gel Etchant, Kerr Restoratives; Orange, CA) was applied to the enamel surface for 30 seconds, rinsed with water for 5 seconds, and gently air-dried. A universal adhesive (G-Premio Bond, GC America; Alsip, IL) was applied to the enamel surface and allowed to sit for 10 seconds, air-dried for 5 seconds, and light-cured for 10 seconds using an LED curing light (Silverlight, GC America). (Figure 6)

9- The clear silicone matrix was placed over the maxillary arch and flowable resin composite (shade A-1, G-aenial Universal Flo, GC America) was injected through a small opening above the preparation.The resin composite mix was cured through the clear resin matrix on the incisal, facial, and lingual aspects for 40 seconds each. (Figure 6).

10- When removing the matrix, it is important to gently flex the silicone material over the composite sprue to prevent the matrix from tearing. The incisal composite sprue was removed with a 12-fluted tapered finishing bur) (Neumeyer H274) and the excess polymerized resin composite was removed with a scalpel blade (#12 Bard-Parker, BD Medical; Franklin Lakes, NJ). (Figure 7).

11- The proximal surfaces and contours were smoothed with finishing strips used sequentially according to grit, ranging from fine to extra-fine (ET Composite Strips, Brasseler). (Figure 7).

12- After the finishing process completion for this tooth, the procedure was repeated for each tooth separately to insure complete separation between all teeth.

13- The final step is the protocol of polishing which included polishing with a silicone point (ET Illustra, Brasseler), then a goat-hair wheel (Soft Goat Hair Brush, Brasseler) and diamond polishing paste were used to further refine the surface luster of the resin composite and finally a high surface gloss was

Figure 6: The clinical steps of bonding and injection.

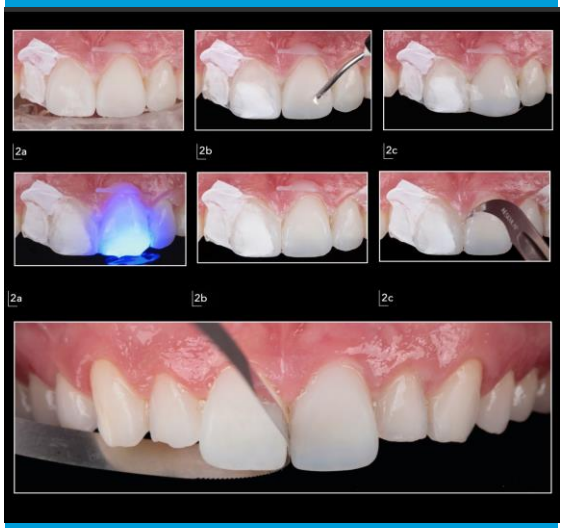


Figure 7: The clinical steps of finishing.

accomplished with a dry cotton

buff (Cotton Buff Wheel, Brasseler) applied with an intermittent staccato motion. (Figure 8).

Figure 8: The clinical steps of polishing.

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Egyptian Prosthodontic Association (EPA)

Address: 15 Ahmed Abo El-Ela St. – 8th district Nasr City, Cairo Egypt.

Mobile : 010 28203484 (Calls & Whatsapp) Phone: 02 26705035