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# Direct Veneer

A Project

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By

**Sama Akram**

Fifth Grade

Supervised by

**Assist.Prof. Dr. Linz Ali**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# وفوق كل ذي علم عليم

صدق الله العظيم

سورة يوسف الآية 76



# *Dedication*

*To my parents*

*Whose love, support, encouragement and prays of day and  
night make me able to get such success and honor*

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# Introduction

The demand for esthetically pleasing restorations in clinical dentistry is ever growing. There are a variety of procedures and material options to choose from. This choice is based upon the wants and desires of the patient. It is very challenging for the dentist to satisfy the needs while at the same time keeping within the budget of the patient. As dentists, it is required of us to develop the skill sets for providing esthetically pleasing results without compromising the biological and functional principles of natural dentition. There is usually no one procedure or material indicated for all situations and providing the patient with multiple options is the key. Veneers are well suited for esthetic and conservative improvement of anterior and posterior teeth.(1)

A veneer is a layer of tooth-colored material that is applied to a tooth to restore localized or generalized defects and intrinsic discolorations. Common indications for veneers include teeth with facial surfaces that are malformed, discolored, abraded, or eroded or have faulty restorations(2).

The direct composite veneer is among the more minimally invasive treatment modalities available for the rejuvenation and restoration of patient's smile. However, placing a direct veneer in a naturally esthetic manner requires an understanding of polychromicity; the different thickness of dentin and enamel in different parts of the tooth; and how to alter the hue, chroma, and value of the sequentially layered veneer restoration (3)

The main reason for failure of direct composite veneers is due to loss of anatomical form due to wear and also changes in color. Thus, the poor wear resistance of composite materials limits the long term success of these restorations and success cannot be guaranteed making case-selection even more critical. Usually, only the six maxillary anterior teeth require correction because they are the most noticeable when a person smiles or talks. The maxillary first

premolars (and, to a lesser extent, the second premolars) also are included, however, if they, too, are noticeable on smiling. Discolored mandibular anterior teeth are rarely indicated for veneers because the facio-incisal portions are thin and usually subject to biting forces and attrition. Veneering mandibular teeth is discouraged if the teeth are in normal occlusal contact because it is exceedingly difficult to achieve adequate reduction of the enamel to compensate for the thickness of the veneering material (4).

### **1. Indication:**

1. Advanced esthetic problems of anterior teeth. Tooth discolorations, rotated teeth, coronal fractures, diastemas, discoloured restorations, palatally positioned teeth, abrasions and erosions are the main indications for direct laminate veneer restorations. (5)



Fig 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.(6)

2. Underdeveloped teeth, such as a peg lateral, are usually not color compromised. Generally, existing tooth structure and composite are used to build out a functional, larger, more true-to-life tooth in the space available. With orthodontically compromised teeth, orthodontic therapy can be done first or a buildup to create a thicker tooth to compensate for the malposition. Fractured and chipped teeth are treated similarly. Worn teeth are the result of

Para function, faulty occlusion, or loss of vertical dimension. It is essential to pay careful attention to how function and the desired esthetics relate, evaluate the condition on a mounted model using a face bow.(7)



**Fig 2: Peg lateral incisor(8)**

## **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.

(9)

### **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. Unlike indirect restorations, direct composite placed into undercuts or around corners without removing tooth structure. (10)
2. Non-invasive. (11)
3. Its low cost, that the restoration may be evaluated as a reversible treatment procedure, and the restoration can be repaired intraorally.(12)

### **4. Disadvantages:**

All required maintenance is a disadvantage.

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. Drinking hot coffee, carbonated beverages or alcohol may increase discoloration (13)(14).



**Fig (3): Defective composite veneers with marginal staining**

2. Microleakage, low abrasion resistance, and plaque accumulation so they are more appropriate to use for anomalies limited with enamel and as provisional restorations (15).

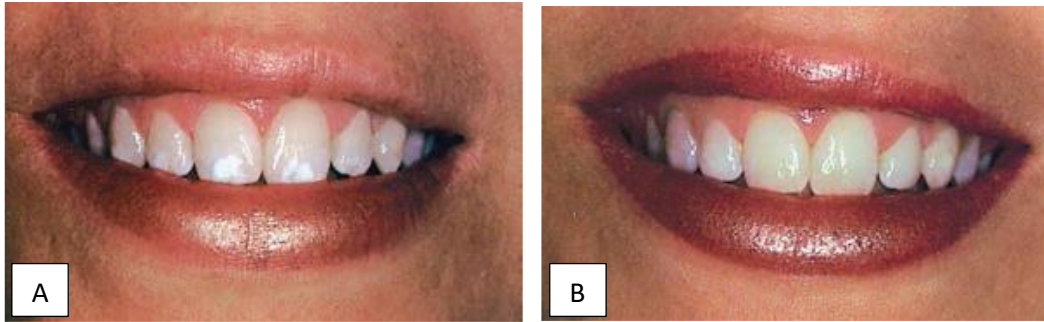


**Fig (4): Defective or improperly done existing veneers note significant gingival overhang with associated purulent exudate (16).**

#### **5. Classification of veneer :**

- according to the technique :
  1. Direct veneer
  2. indirect veneer
- ❖ direct veneer can be classified into :-
  - a. Direct partial veneer:

Small localized intrinsic discolorations or defects that are surrounded by healthy enamel are ideally treated with direct partial veneers these defects can be restored in one appointment with a light-cured composite. Preliminary steps include cleaning, shade selection, and isolation with cotton rolls or rubber dam. Anesthesia usually is not required unless the defect is deep, extending into dentin. (17)



**Fig 5:A Hypocalcified areas of maxillary anterior teeth. B restoring with direct-composite partial veneers. (18)**

**b. Direct full veneer:**

Extensive enamel hypoplasia involving all maxillary anterior teeth was treated by placing direct full veneers. Placing direct full composite veneers is very time consuming. (19)



**Fig 6: Enamel hypoplasia of maxillary anterior teeth, Direct full veneers using light-cured composite (20).**

- According to the amount of enamel remaining : ( proposed by LeSage in 2013)

**Table 1-1: veneer classification**

Reduction	Facial Enamel	Remaining
CL-I No-prep or practically prepless	Detectable with magnification, with or without gingival finish line	95% to 100%
CL-II Modified prep-less or minimally invasive	Up to 0.5 mm	80% to 95%
CL-III Conservative design	0.5 to 1 mm	50% to 80%
CL-IV Conventional all-ceramic design	1+ mm	>50%

## 6. Material selection:

The procedure for direct composite bonding has undergone an incredible evolution, along with an upgrade in materials that help create proper esthetic. In the late 1970s macrofill composites were not very polishable, so dentists could not achieve as much of a shine as is possible today, these resins gave way to two classes of materials in the middle 1980s: the microfills, hybrid microfills and nanofills (21).

The original composites used most often for veneering were microfills, primarily because of the desire to mimic the reflectivity of the enamel surface. Certain types of applications of this material created significant problems in

chipping because microfills have inadequate tensile strength and elastic modulus to prevent fracture (22).

Then the technique evolved to use layered composites, with hybrid composites or large particle composites to replace missing tooth structure. That technique, while not eliminating fractures of composites, lowered the risk to a more acceptable level. The advantage of layering direct composites with different particle sizes is that it refracts light differently and improves the esthetic matching with tooth structure. Composite materials, especially microfills, also have a tendency to discolor over time. Over-heating the material during finishing will hasten the discoloration. However, because composites have about 3 percent water sorption, over many years they will absorb all water soluble stains and discolor as they age(23).

The introduction of so-called “nanofilled” and “nano-hybrid” materials therefore appears a logical continuation of this trend and a number of dental material manufacturers have marketed these as the advancement of dental materials into the field of nanotechnology (24).

A “nano-material” possesses components and/or structural features, such as fibers or particles, with at least one dimension in the range of 1-100 nm and subsequently demonstrates novel and distinct properties (25) this material has been claimed to “possess polish retention similar to that of microfills and also to exhibit mechanical and physical properties comparable with hybrid composites (26). The addition of even small quantities of nanosized silica particles has been identified to improve the mechanical properties. It was highlighted that the addition of 1% and 2.5% mass of nano-sized fibrillar silica to a BisGMA/TEGDMA resin significantly improved the flexure strengths (128 and 130MPa) compared with conventionally filled composite resins, (110 and 120 MPa respectively). This was suggested to occur as a consequence of the reinforcing effect of highly separated and uniformly distributed nano-fibrillar



silica, while the formation of agglomerates of fibrillar silica may weaken the resulting material (27)

## **7. Tooth preparation:**

The preparation of the teeth greatly influences the durability and color (translucency and tonality) of the final restoration, since the tooth preparation will determine the inner superficial contour and the thickness of the restorative material. This stage is determined by the evaluation of the condition of the teeth, the indications of the clinical situation, and the material chosen (28). Concepts regarding the preparation of teeth for laminate veneers have changed over the past few years. Although early concepts suggested minimal or no tooth preparation, current belief supports removal of varying amounts of tooth structure(29) .with regard to direct veneers, the veneer is more likely to be dislodged when no tooth structure is removed before the etching and bonding procedures are done. If the veneer is lost, it can be replaced. The patient may live in constant fear, however, that it will happen again, possibly causing embarrassment. The reversibility of no-prep veneers may seem desirable and appealing to patients from a psychological standpoint; however, few patients who elect to have veneers wish to return to the original condition. In addition, removing full veneers with no damage to the underlying unprepared tooth, as noted earlier, is exceedingly difficult, if not impossible. To achieve esthetically pleasing and physiologically sound results consistently, an intra-enamel preparation is usually indicated. The only exception is in cases in which the facial aspect of the tooth is significantly under-contoured because of severe abrasion or erosion. In these cases, mere roughening of the involved enamel and defining of the peripheral margins are indicated. Intra-enamel preparation (or the roughening of the surface in under-contoured areas) before placing a veneer is strongly recommended for the following reasons:

1. To provide space for bonding and veneering materials for maximal esthetics without over-contouring
2. To remove the outer, fluoride-rich layer of enamel that may be more resistant to acid-etching
3. To create a rough surface for improved bonding
4. To establish a definite finish line, chroma, and value of the sequentially layered veneer restoration (30).

The preparation design for laminate veneers should simultaneously allow an optimum marginal adaptation of the final restoration and demonstrate utmost respect for the hard tissue morphology. Enamel reduction is required to improve the bond strength of the resin composite to the tooth surface. In doing so, the prismatic surface of mature unprepared enamel, which is known to offer only a minor retention capacity, is removed(31).

One of the main objectives of the preparation is to maintain the entire contour in intact enamel whenever possible, because the better the adhesion between the veneer and the prepared tooth, the better the stress distribution in the system enamel–composite–ceramic (32)

- Facial reduction:

Is achieved by first identifying and then reducing three separate facial zones: the incisal third, the middle third, and the gingival third in that order.(33)

Concerning resin composite veneers, Vanini et al in 1996 emphasized this material's ability to limit the entity of reduction due to the low elasticity module and resulting high capacity to absorb functional stresses. In fact, it is not mandatory to have a minimum thickness of 0.5 mm for resin composite; Perdigao and Lopes in 1991 suggested a 0.2 to 0.4-mm reduction at the gingival

third, a 0.3- to 0.6-mm reduction at the middle third, and a 1.5-mm reduction at the incisal third(34).

A tapered, rounded end diamond instrument is used . It is critical that the tip diameter of the diamond be measured because the diamond will serve as the measuring tool in gauging proper reduction depth. A diamond with a tip diameter of 1.0 to 1.2 mm is recommended. The tip diameter of the diamond used in this series is 1.2 mm.(35)



**Fig 7:facial reduction(36)**

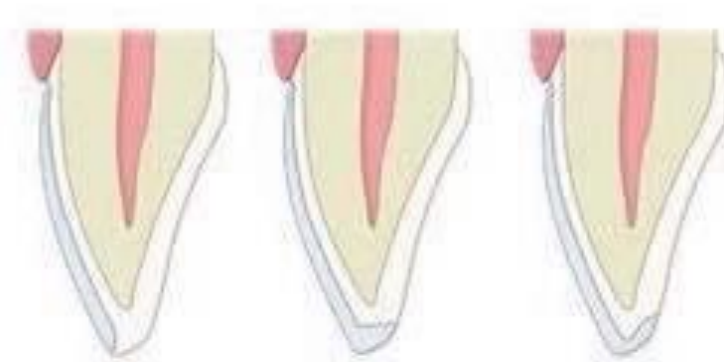
➤ **Insical one third reduction:**

To prepare the incisal zone of facial reduction, the diamond first is aligned parallel with the facial surface of the incisal third of the tooth. The diamond is then moved mesiodistally from line angle to line angle until the desired depth of approximately 0.6 mm is attained. Again, the tip of the diamond is used to gauge this reduction. Reduction depth can be verified by viewing the tip of the diamond in proximity to the unprepared tooth structure gingival to this reduced area when viewed from the proximal, facial, and incisal aspects .Care also must be taken to round the mesial and distal facial line angles during this reduction sequence to ensure uniform facial reduction.

A minimum reduction of 1 mm or, more desirably, 1.5 mm(37).

Several types of preparation These types differ only at the incisal region of the tooth. At the incisal third, the preparation may be modified (38):-

- i) “Window” preparation, the most conservative and maintain enamel in incisal third, which results in a visible line between enamel, resin, and ceramic; in addition, the remaining structure is more prone to fracture.
- ii) “Butt joint” preparation, which recovers the incisal of the tooth ,maintaining its format.
- iii) Incisal overlapping , of the incisal edge, this design is indicated. Some operators also prefer this design because of enhanced adaptation of the veneer to the lingual preparation margin attributable to a “lap sliding” fit.



**Fig(8): types of incisal one third preparation**

➤ **Middle third reduction:**

By carefully watching the striations being created by the diamond mesiodistally during the reduction of the middle third, it is easy to see when the level of the previous incisal third reduction is reached. When a similar reduction level has been reached, the striations in the middle one third will then extend into the area previously reduced in the incisal third. Stop immediately. Do not go deeper. Again, a reduction depth of approximately 0.6 mm is desirable.

Moreover, the reduction depth again can be verified by viewing the tip of the diamond in proximity to the unprepared tooth structure gingival to this reduced area when viewed from the proximal, facial, and incisal aspects. Care also must be taken to round the mesial and distal facial line angles during this reduction sequence to ensure uniform facial reduction.(39)



**Fig (9): middle third reduction (40)**

➤ **Gingival one third reduction:**

Reduction of the gingival one third is straightforward and simply involves removal of the remaining “island” of unprepared tooth structure to a level consistent with the surrounding previously prepared tooth structure. The stress distribution in ceramic veneers made with three different cervical designs: (1) a “feather-edge” configuration (modified razor-edge configuration), (2) chamfer configuration, and (3) shoulder configuration. The results showed that in the presence of moderate stress, the cervical margin design does not influence veneer success. Further, when occlusal loads have various directions reflecting the forces applied on the tooth during mastication, a shoulder configuration is preferable. This study also demonstrated that veneer adhesion is the most important factor to reduce compression and traction forces. It is generally agreed that the position of the cervical margin is a key factor in soft tissue reaction (41).



**Fig (10): Gingival one third reduction**

- **Proximal reduction**

At the proximal region, the preparation must follow the papilla and extend until interproximal contact. Perdigao and Lopes, 1991 argue that the preparation must extend to the contact area without involving it; conversely, Christensen in 1993 and Caleffi and Berardi in 1994 suggest including half the contact area in the preparation (42).

No conclusive evidence can be found for what is the best way to prepare the interproximal area of a tooth for a laminate veneer. Opinions range from virtually no preparation, to a preparation that stops just short of the interproximal contact, to a slight opening of the interproximal contact. The clinical reality is that each case and each tooth is different. It is up to clinicians to use their best judgment in this area. However, the evidence is clear that margins in enamel are preferred. The margin design here should be such that the margins are not visibly detectable and that a minimum amount of tooth structure should be removed to accomplish this goal (43).

## 8. Clinical case:

Setp1: treatment plan



**Figure 11: Displeasing composite veneer on tooth**



**Figure 12: Preoperative view showing lack of luminosity**



**Figure 13: Prior restoration with unsuitable surface structure**

## Step 2: tooth preparation

- The patient was anesthetized and no retraction cord was placed. The existing composite restoration on #8 was carefully removed. Then the use of depth cutters has been recommended to control tooth preparation as standardized objects allow accurate judgement of depth(44) .



**Fig (14): depth cutting burs**

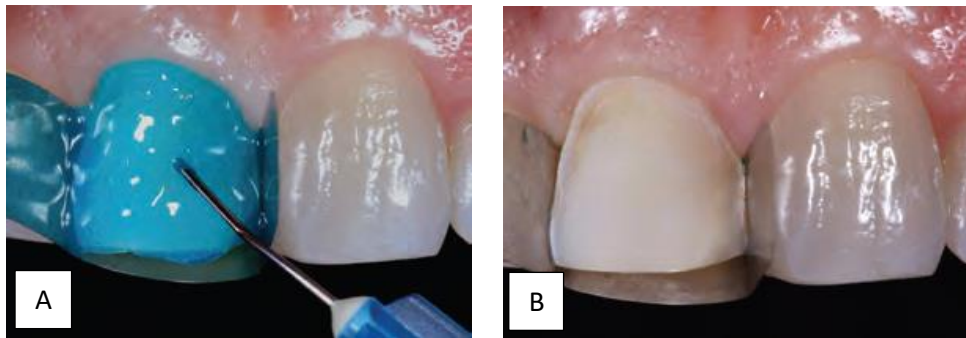
- The preparation left sufficient room for creating incisal characteristics and opalescence.



**Fig (15):Tooth preparation**



- An acid-etch phosphoric acid was applied to the enamel and left to penetrate for 15 seconds, then rinsed. The etchant was then applied to the dentin, left to penetrate for 10 seconds, and rinsed .After etching, the frosty appearance of the exposed dentin was visible on the distal/gingival surface.(45)



**Figure 16: Etchant applied ,Frosty-looking dentin**

- A dentin bonding agent (Bond Force, Tokuyama) was carefully applied, air-thinned, and polymerized, completing the preparation

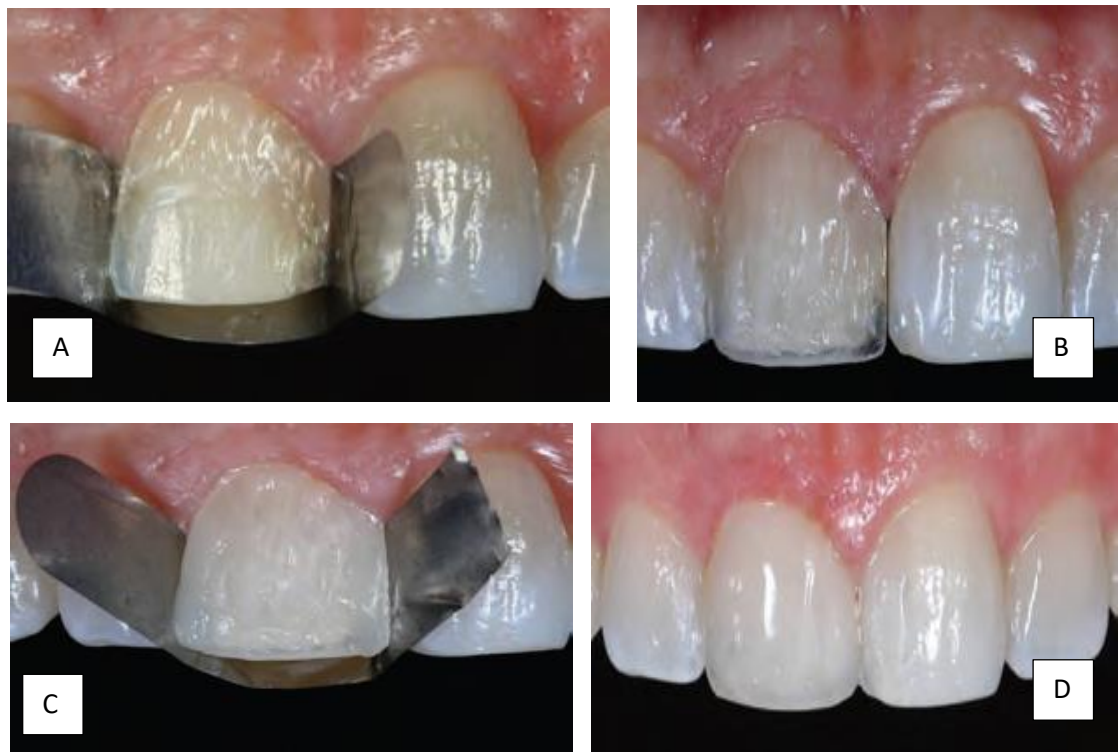


**Fig (17):Dentin bonding agent applied.**

### **Step3: composite layering process**

The first increment of composite was layered onto the preparation, applied to the gingival third and striations were created to diffuse the light, consistent with the anatomy of tooth. build an incisal frame. Next, on the mesial

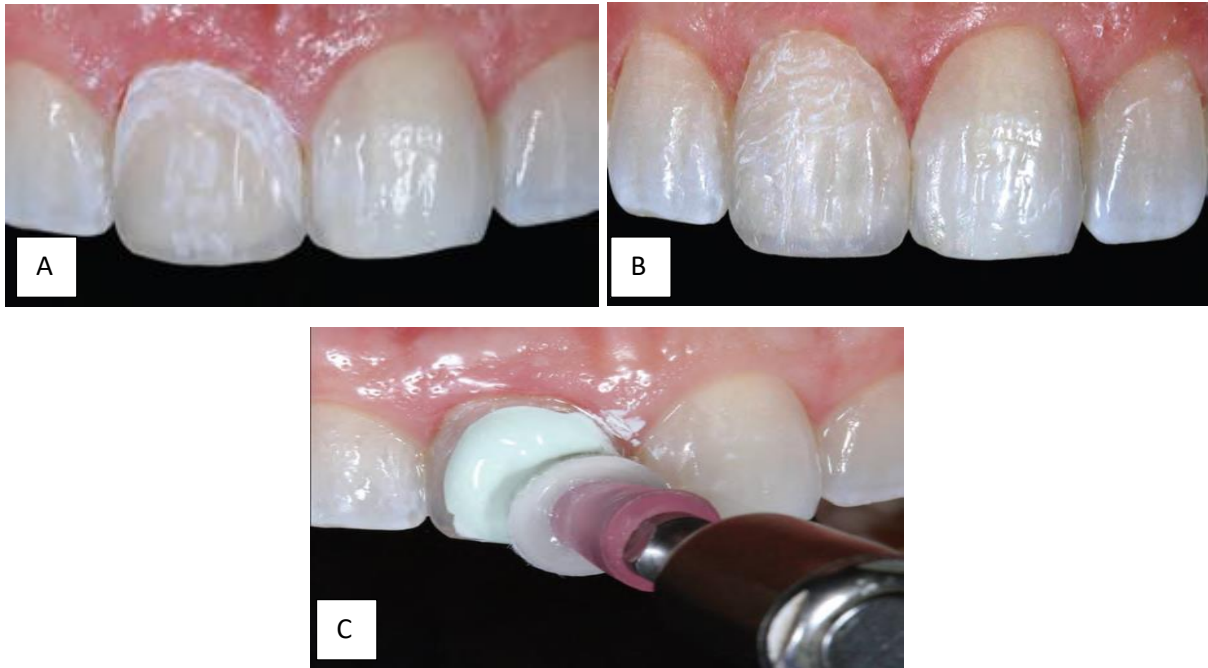
portion of #8, create characterizations similar to those observed in #9, and light-cured.



**Figure 18: A.Application of DA2 composite.B. Composite characterization C.High-value translucent placed and light-cured D.Enamel blend matching natural tooth.**

#### **Step 4: finishing and polishing**

- The micro-morphology of the cervical third of the tooth was created using green stones was used to create the surface texture and micro-architecture of the tooth(46) .Before finishing and polishing, it was imperative to ensure mimicry of light transmission of the natural tooth, so the facial surface and micro-morphology of the structure were refined using carbide finishers .The final polish was completed using polishers, paste, and discs (47).



**Fig (19):A. Forming surface texture and micro-architecture. B. Refining with carbide finishers. C. Final polish**



**Fig 20: Finished Case**

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