

CASE REPORT

Direct Composite Resin Veneer Technique: A Clinical Case Report of Management of Misaligned Dentition

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Abstract

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. Laboratory fabricated porcelain or composite resin veneers present optimal esthetics and durability. Direct composite veneers provide an additional viable option to the clinician to use where porcelain veneers cannot be used or afforded. Mastering the art of direct composite resin veneering is not easy and is highly technique sensitive. However, when performed for the appropriate case it allows for artistic expression and very impressive clinical results. Here we present a clinical case where a young patient who could not afford extensive dental restorative or orthodontic treatment was treated with direct composite resin veneering to correct misaligned

anterior maxillary teeth. The results obtained were both esthetically and functionally acceptable and allowed for the patient to have a smile she otherwise could not attain.

Key Words: Veneers; composite resin; direct composite veneering; misaligned teeth; aesthetics.

Preamble

The restoration and re-establishment of a patient's dental aesthetics is among the important requirements of dentistry today [1,2]. Restorative dental practice has been expanded and revolutionized by recent developments in the field of adhesive dentistry [3-5]. Porcelain veneering is considered the gold standard as an esthetic restorative option when used for the right clinical case [6-8]. Porcelain veneers fabricated in the laboratory are customized for the patient and expensive. Due to the reduction of healthy tooth structure required to place porcelain veneers, many other techniques have been developed to preserve tooth tissue [9,10]. With the introduction of micro-hybrid and nano-hybrid composite resins, direct composite veneering has been looked towards as a more conservative alternative to porcelain veneering [11]. Better finishing and polishing can be carried out with these composite resin materials and the results can be matched closely with porcelain [12,13]. Direct veneering with composite involves application of resin directly to the tooth structure and sculpted to correct esthetic defects of color, anatomy and morphology [14]. Direct composite veneering has many advantages such as being a chair-side technique, not requiring multiple appointments, minimal application time required, minimally invasive, preserves natural tooth structure and less expensive due to no laboratory costs involved. Although direct composite veneering has quite a few advantages, yet it is prone to failure because it highly technique sensitive and dependent on the skill of the clinician [15]. Also, failure is attributed to lack of durability when used in thick sections, changes in color and excessive wear [16]. Case selection is extremely important for the success of this direct restorative technique and ideal clinical indications include teeth discolorations, anatomical deformities, diastema, misaligned or worn dentition [8,17]. Teeth position and alignment determine the complexity of the case and a good and correct diagnosis and treatment plan is of paramount importance.

The clinician must possess a deep understanding of the concepts of chroma, value, hue, translucency and

opacity in order to obtain an esthetically pleasing and acceptable post veneering result [18]. The relationship of these concepts of the natural tooth structure with the physical and optical properties of composite resin materials is very crucial. The manipulation of composite resin and its placement and sculpting to resemble closely the natural form of teeth is an art and requires skills that can only be honed by extensive practice and patience. This clinical case report presents step-by-step sequence for restoring the esthetics of a patient with misaligned anterior maxillary teeth with direct composite veneer technique.

Case Report

History:

The patient was a twenty-year-old girl in excellent health (no past or present medical history to report). She presented for consultation unhappy with her smile as her front teeth were misaligned. The patient had never had any dental treatment done before. She sought a solution to her 'crooked smile' as it was affecting her confidence and self-esteem. However, the patient could not afford dental treatment as she was socio-economically at a disadvantage. The patient's upcoming marriage was the final motivation to seek a smile makeover. The patient made it very clear that she would not be able to pay for the treatment and neither would be available for extensive orthodontic intervention lasting many sessions.

Clinical Examination and diagnosis:

Clinical examination revealed no missing teeth with a full set of dentition. There were no dental restorations that present on any teeth. Healthy periodontal tissues were seen upon soft tissue examination. The patient's oral hygiene was reasonably acceptable with some staining on anterior teeth due to difficulty in brushing owing to misalignment. No evidence of plaque accumulation or calculus formation was noted. The gingival display, gingival contours and the papillary height were noted to be adequate. No soft or hard tissue pathology was identified and the temporomandibular joint (TMJ) examination revealed no signs or symptoms of any pathology with normal healthy joints and the range of motion within normal limits.

An esthetic examination showed that the full smile revealed a display of teeth to the first molar and ~4 mm of incisal edge along with the labial surface of tooth #21 displayed with lip at rest. Lip movement, from rest to full smile, was approximately 3mm to 6 mm with no display of gingival tissues. It was observed that the tooth #21 had labial proclination and overlapping the teeth # 11 and #22 resulting in the esthetically unacceptable situation (Figure 1A, B & C). The proportions of teeth were natural and within the accepted width to length ratio and the golden proportion [19,20]. There was no canting of the midline noted and the tooth color for #21 was high in yellow brown chroma and low in value. The remaining teeth structures were observed to be healthy with reasonably high value enamel characterization.

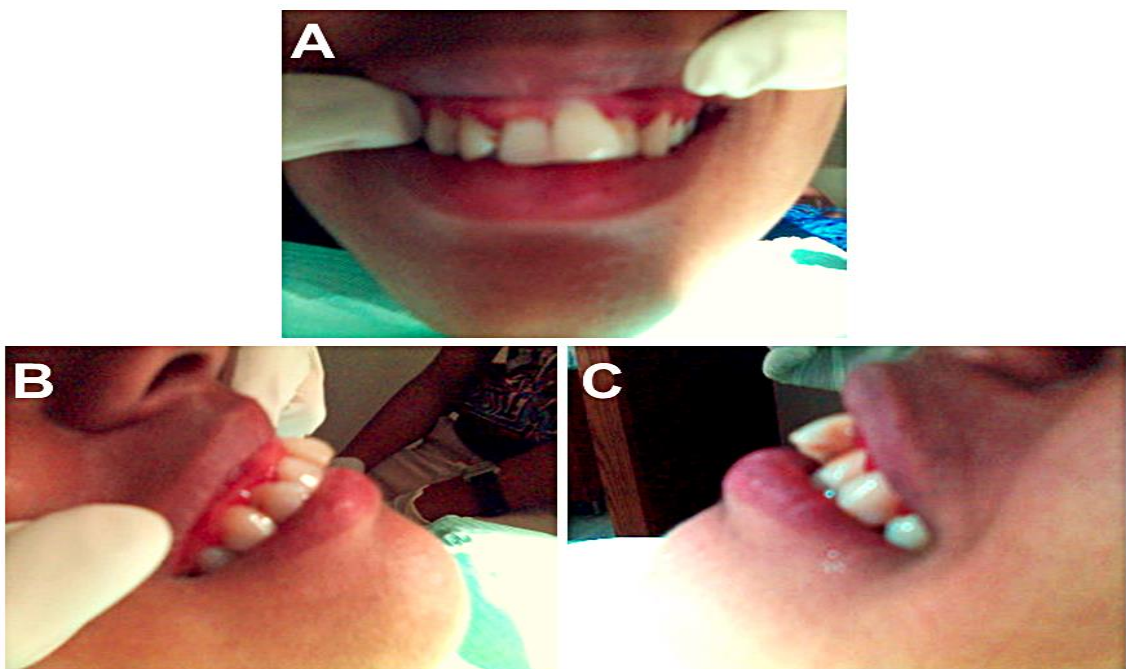


Figure 1 A, B, & C. Preoperative views of the misaligned maxillary anterior teeth.

Treatment Plan:

The prescribed treatment plan was developed keeping in view that the patient would not be able to afford expensive treatment and was also not willing to come in for multiple visits over a period of time. These financial and availability constraints ruled out extensive orthodontic and the more expensive porcelain veneering treatment options. The treatment plan was devised to enhance and improve the patient’s smile through direct composite veneering to achieve a more acceptable anatomy and morphology of the misaligned teeth.

The sequence of management and treatment was as follows: (a) Dental prophylaxis and polishing; (b) Preparation of diagnostic models for the analysis of tooth proportions; (c) Elective root canal treatment (RCT) on tooth #21 prior to labial tooth reduction; (d) Preparation and contouring of teeth #11, 21 and 22 to achieve adequate tooth reduction to place composite resin materials with adequate contour, proportions, embrasures and emergence profiles; and (e) Direct composite resin veneering to align and idealize tooth proportioning and contouring with color matching to the natural existing dentition.

Treatment:

Tooth structure preparation

The analysis of study models prepared after full mouth impressions (Figure 2A, B & C) revealed that the labial enamel reduction required for tooth #21 would render the pulp very close to dentinal tissue that would

remain. Hence it was decided to perform an elective RCT on tooth # 21. The patient was anesthetized with 2% Lidocaine 1:100, epinephrine (7.2 mL) and the RCT with pulpectomy and obturation both performed in single visit. Periapical radiograph was obtained (Figure 3I) and the patient was rescheduled for the direct composite veneering treatment after seven days. During the second visit the patient was again anesthetized and the tooth #21 was prepared labially with the tooth structure removed to the extent of being close to the level with the teeth #11 and 22 with a No. 6844 016-diamond bur (Figure 3B &C). The tooth reduction was inspected and refined before depth cuts were added on teeth #11, 21 and 22. The tooth structure was then reduced to and in-between the depth cuts with a No. 6844 016-diamond bur. Next, the incisal edge preparation (1.5 mm) was performed and completed for these three teeth. Closer inspection of the teeth prepared revealed a need for interproximal reduction to allow proper composite placement and contouring. Interproximal reduction of 1 mm mesially and distally was performed for tooth #21. Whereas, a reduction of 0.7 mm was carried out for the mesial and the distal interproximal surfaces for teeth #11 and 21 respectively. When labial, incisal and interproximal preparations were completed, the preparation of the margin and finish line was finalized and all sharp angles were smoothed. Once the prepared teeth were cleaned using prophy-paste, a final inspection was carried out prior to composite resin application.

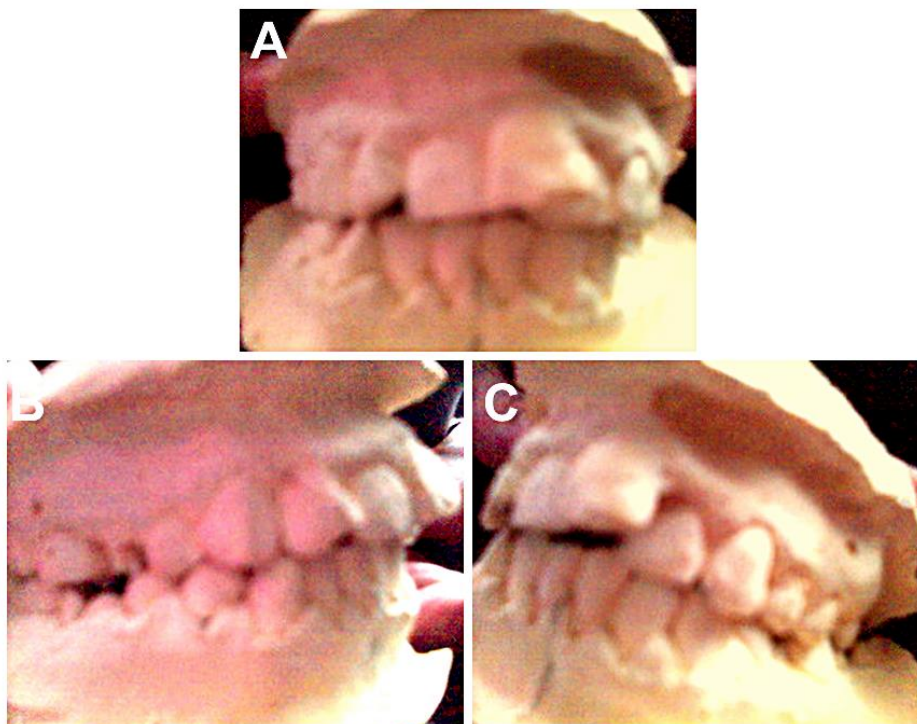


Figure 2 A, B, & C. Diagnostic models for analysis of tooth proportions.

Composite resin application

A dry and moisture free field is mandatory prior to adhesive and composite placement and this is best accomplished by using a rubber dam [21,22]. Unfortunately, due to financial constraints this was not possible and isolation was obtained and maintained using cotton rolls and gauze placed in the labial and buccal sulcus and using high suction evacuation. Following isolation, the adhesive and composite resin placement was initiated. Teeth #11, 21, and 22 were etched with 37% phosphoric acid for 20 seconds each. The teeth were rinsed with water but not dried and wetting and desensitizing agent (Gluma® Desensitizer) was applied to the teeth surfaces. Cotton pellets were used to dab dry the surface gently and a primer and bonding agent (Prime & Bond® NT™, Dentsply Caulk) was applied repeatedly with an applicator brush until an even glossy surface was obtained. The teeth were next air dried and light cured for 6 seconds. Direct veneering was then initiated by layering at the gingival margins using A1 shade nano-hybrid composite resin (IPS Empress direct™,

Ivoclarvivadent®) which was smoothed and light cured for 10 seconds. Shade B1 (IPS Empress direct™, Ivoclarvivadent®) was added to blend over the shade A1 gingivally and also extended to the middle one third of the teeth surface and light cured for 10 seconds. Next, shade SB1 of same composite materials was layered and applied from middle one third to the incisal edge of the teeth where the lingual contour and mamelons were recreated (Figure 3D). Clear Mylar strips was placed interproximally to set and maintain the midline between teeth #21 and 11 and also between the mesial and distal margins of other teeth (from distal of tooth #11 to distal of tooth #22) as composite resin was applied to blend mesially and distally to create the interproximal contour of teeth. A final layer of composite was smoothed over the entire labial surface of all veneered teeth from mesial to incisal and gingival to incisal and light-cured with multiple light exposures to all surfaces for 10 seconds each. This rendered the teeth slightly over contoured with excess composite materials ready for the finishing and polishing process.

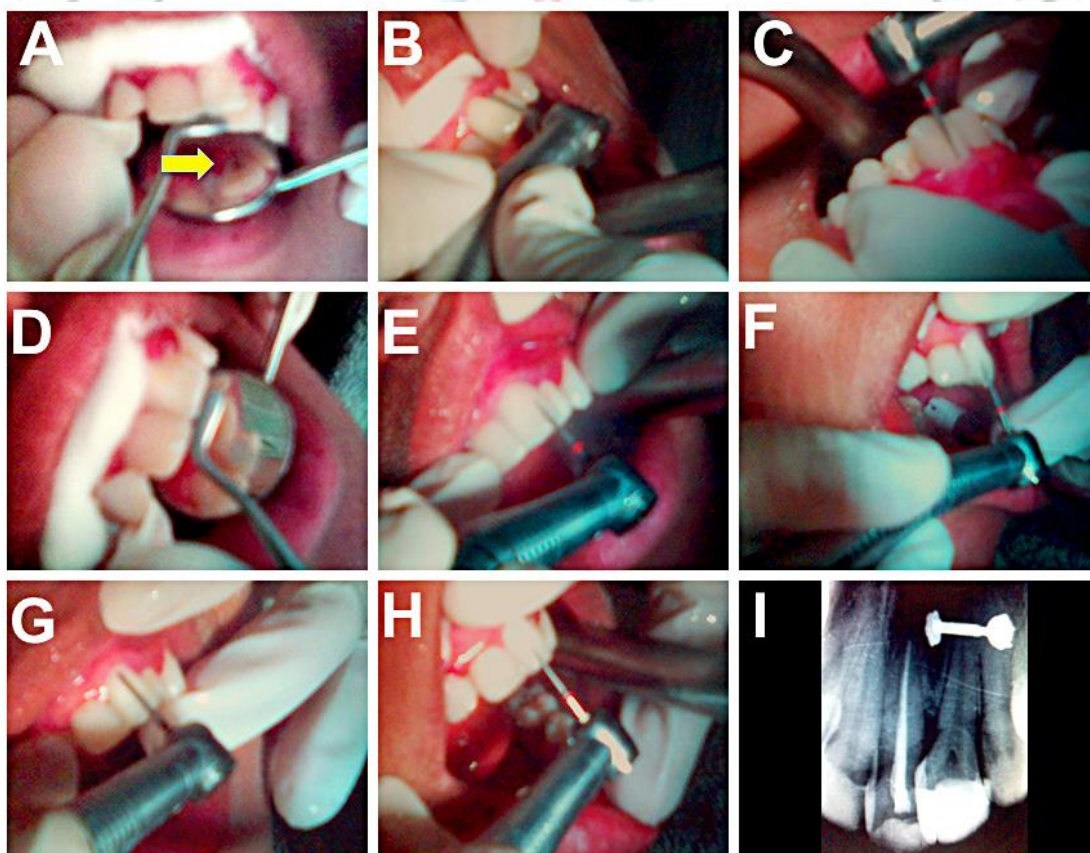


Figure 3 A. Teeth ready for reduction with RCT access cavity being shown in the mirror (yellow arrow); **3 B & C.** Tooth structure preparation and reduction prior to veneering; **3 D.** Composite resin placement and application onto the prepared tooth structure; **3 E & F.** Contouring and shaping of the light cured composite resin to achieve rough anatomical form; **3 G & H.** Finishing of the direct composite veneers to reflect the natural anatomic form and match with the natural teeth; and **3 I.** Periapical radiograph showing the RCT and obturation performed on tooth #21.

Finishing and polishing

Once all direct composite veneers were completed the finishing was carried out and the first step was to achieve a rough anatomical form (Figure 3E & F). Interproximal contouring was initiated using a carbide bur (No. 7901) on teeth #11, 21 and 22 to develop tooth proportions. The gingival one third and the gingival margins of these three teeth were contoured individually with the same carbide bur developing the gingival embrasure form. Following the completion of the gingival form, the incisal and the interproximal embrasures were contoured next with the No. 7901 carbide bur to simulate and match natural tooth morphology. The distal and mesial line angles on the teeth # 11 and 21 were refined to mirror each other. Similar contouring was carried out by creating concavities and convexities on the labial surfaces of both the teeth. The tooth #22 was then shaped to reflect

the natural anatomic form and match with tooth #12(Figure 3G & H).

On completion of tooth anatomy and contouring, the veneered teeth were polished to a matt finish with polishing and finishing system (Dentsply Caulk). The teeth were further fine-polished using flexible cups, points and discs (Cosmedent®, Inc) to obtain a smooth luster. Polishing strips (Flexi-Strips™, Cosmedent®, Inc) were used to refine interproximal surfaces. Final polishing was achieved via a slow speed hand piece at a high rpm (revolutions per minute) using FlexiBuff™ discs. After the veneered teeth were inspected for final uniformity and polish the occlusion was evaluated with an articulating paper. After one week the patient was recalled for a follow-up and the direct composite veneers were re-examined and polishing repeated and photographs obtained (Figure 4A & B).

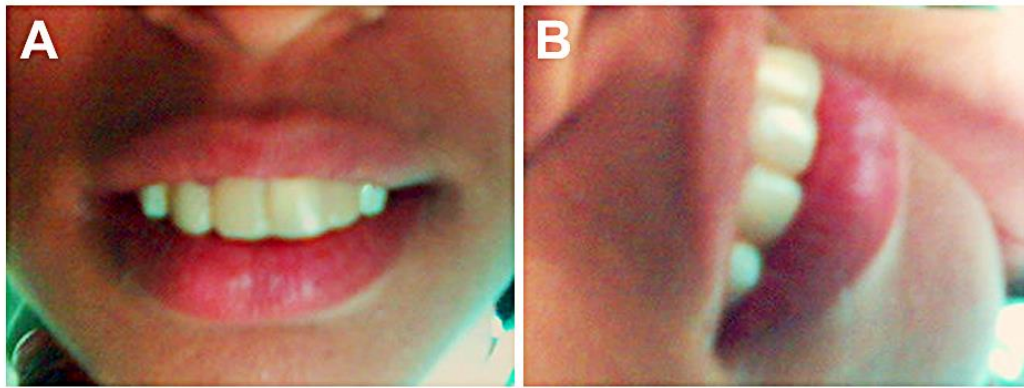


Figure 4 A & B. Postoperative views of the aesthetically and functionally restored maxillary anterior teeth with direct composite resin veneer technique.

Conclusion

The patient was very happy with the results of the direct composite veneering and the new smile makeover was a significant improvement to her previous esthetic outlook. Direct composite veneering carried out with ultrafine midway-filled densified resin composites are very effective and a valuable procedure choice for conservative and esthetic treatment of misaligned and/or malformed anterior teeth [23]. The success of these direct composite veneers is heavily dependent upon the appropriate case-selection and the skills possessed by the clinician. It has been shown that restorations on central incisors and small to medium sized unilateral restorations show best esthetic performance with favorable color matching, surface smoothness and translucency after five years [23]. The main reason for failure of direct composite veneers is due to loss of anatomical form due to wear and also changes in color [6]. 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.

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