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The Injection Resin Technique - A Minimally Invasive Concept for Aesthetic Restoration: A Case Report

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Abstract: ***The injectable moulding composite resin technique is an indirect method that uses a transparent silicone index for accurate and predictable translation of a diagnostic wax - up into composite restorations without tooth preparation. This case study is about a 20 - year - old boy who had aesthetic and functional issues related to tooth spacing and diastemas. An articulator was used to simulate functional movements in order to create a wax - up, and then a transparent silicone index was made over the wax - up. Vent holes were created in this clear silicone index through which flowable composite was injected and polymerized to reconstruct the teeth. The method explained is affordable and minimally invasive. The objectives of the therapy are to restore appropriate function and aesthetics; benefits include preservation of tooth structure and cost - effectiveness. Stable and predictable outcomes are achievable with careful design and application of best practices.***

Keywords: composite resin injection, esthetic rehabilitation, functional rehabilitation, transparent silicone index

1. Introduction

State - of - the - art oral rehabilitation techniques aim for both esthetic and functional outcomes. Contemporary dental materials, clinical techniques such as mockups, and integrated treatment planning enable the clinician to both virtually and clinically view and assess the treatment plan beforehand. The traditional process of placing direct anterior restorations is clinically demanding to complete, often involving a tedious layering process, which limits the ideal indication of them to only a few restorations at a time. Furthermore, traditional direct restorations are not made using pre - established tooth shapes or contours, making the procedure operator - dependent and less foreseeable. When multiple anterior restorations or a smile change is required, indirect restorations are preferred by clinicians.

The injectable composite resin technique is an indirect method that uses a transparent silicone index for accurate and predictable translation of a diagnostic wax - up into composite restorations without tooth preparation. With recent advances in dentistry, silicone indices are incredibly helpful in restorative procedures, helping with everything from tooth preparation and final restorative stages to the planning stage. A clear silicone index is used in the indirect/direct injectable composite resin process to ensure precise and consistent translation of a diagnostic wax - up into composite restorations. For usage with this method, flowable composites are favored over conventional composites because they can fill the mold beneath the silicone index without the index requiring external pressure. As a result, the issues of index distortion and inadequate results are resolved. Clinically acceptable physical qualities have been demonstrated by both flowable and conventional composites. Compared with conventional ceramic veneer procedures, the injectable composite resin technique is minimally invasive and relatively inexpensive. The present case shows the successful use of this technique, with certain modifications, in a case involving a 20 - year - old boy with esthetic and function problems associated with multiple diastemas.

2. Case Report

A 20 - year - old male patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College, and Hospital Chh. Sambhajinagar with the chief complaint of multiple spacing in the upper anterior teeth. On clinical examination, multiple spacing was seen in his maxillary anterior teeth which resulted in functional and esthetic problems. Esthetic and functional rehabilitation treatment was suggested and three treatment options were presented. The first option involved fabricating and placing ceramic veneers, which would offer the best esthetics with superior precision and shade match. The second option involved composite veneers, which would be more cost - effective. The patient chose the latter as it was more convenient and affordable for him.

Figure 1: Pre - operative photograph (labial view)

Figure 2: Pre - operative photograph (right lateral view)

Figure 3: Pre - operative photograph (left lateral view)

At the first appointment, a set of photographs and impressions were acquired for further analysis, and dental casts were prepared. Dental casts were then sent to the dental lab for a wax mock - up. The Vita shade guide (Vita classical A1–D4 shade guide, Vita Zahn Fabrik) was used for shade selection in consultation with the patient. The A2 shade was selected for the incisors and canines, respectively. In the second appointment, a clear silicone index was made on the dental cast and six composite veneers were planned. First, an impression of the wax - up was recorded using clear silicone (GC clear polyvinyl siloxane material). It was loaded on a non - perforated rim - lock metal tray and an index was prepared from the wax mock - up. Vent holes for the injection of the flowable composite were created on the incisal edges of the silicone index. Following etching and rinsing, the teeth were dried and isolated with polytetrafluoroethylene tape.

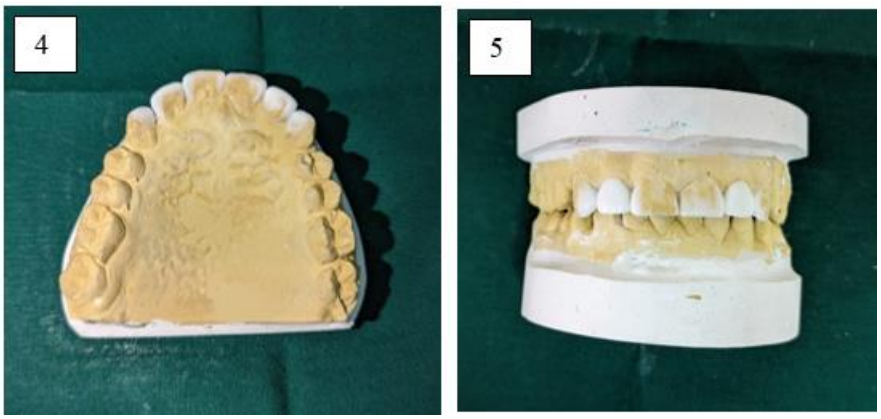

Figure 4 & 5: Wax mockup on a dental cast

Figure 7: Exaclear polyvinyl siloxane material

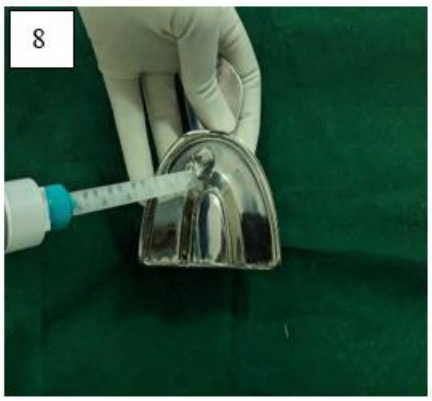

Figure 8 & 9: A transparent index made from the wax mock - up

A single - component adhesive (Prime, self - etch, bonding agent) was used for bonding. The transparent silicone index was placed in the correct intraoral position, and a syringe filled with flowable composite (BEAUTIFIL INJECTABLE) was inserted through the vent holes on the incisal edge. The material was injected into the space between each tooth respectively and the silicone index. It was further polymerized with an LED curing light for 3 seconds. Excess material was removed from the sulcular area using a dental probe. Definitive light curing from the buccal and incisal surfaces was performed through the silicone index for 40 seconds. Once polymerization was completed, the polytetrafluoroethylene tapes were removed and the veneers were polished to a glossy finish using interproximal strips, and polishing rubbers with polishing paste, to prevent plaque accumulation and staining. The anterior teeth showed no heavy contacts in maximum intercuspation (checked using 8 - μm - thick articulating paper). Interproximal contacts were checked using dental floss. The patient was recalled every 2 weeks for the next one month. No soft tissue inflammation, bleeding on probing, or significant wear were detected.

Figure 10: Trial of the transparent index on the wax mock - up

Figure 11: Self - etch bonding agent (Prime)

Figure 12: Injectable composite

Figure 13: Creating vent holes on the silicone index

Figure 14: Etching the tooth surfaces with 37% phosphoric acid

Figure 15: Bonding the etched tooth surfaces

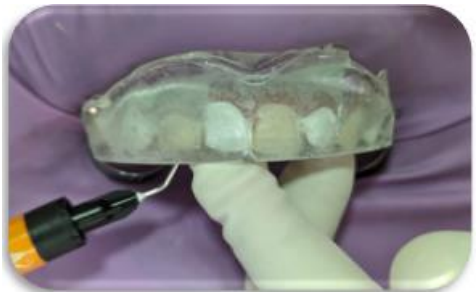

Figure 16: Injecting flowable composite through the vent holes of the clear index.

Figure 17: Immediate post - operative image

Figure 18: Pre - operative image

Figure 19: Immediate post - operative image

3. Discussion

In the literature, different restorative approaches have been proposed to perform aesthetic restorations. In addition, recent studies show that higher - load fluid resins offer higher mechanical properties (flexural strength and flexural modulus), higher resilience, a high modulus of elasticity, wear resistance, and better polishing and shine than conventional universal resins. Another advantage of this technique is the low cost and good aesthetic results since the silicone matrix is a replica of the diagnostic wax - up. Thus, the position, shape, and contour are more faithful compared to other incremental techniques. The advantages of the injection resin technique are: Accurately transferred from wax up into the mouth, a time - saving method, economical, thus allowing a broader patient base, and conservative as little/no tooth adjustment is required. with regular maintenance optimal aesthetics can be maintained for many years.

This case study details how a young adult patient's multiple diastemas were successfully corrected with injectable composite resin, albeit with some changes. The injectable composite resin approach is significantly more cost - effective, results in less loss of healthy tooth structure, and takes less clinical time than traditional ceramic veneer operations. It is therefore suitable for use as a merely additive treatment. Because of superior wettability on any substrate, flowable composites display better placement characteristics and marginal adaptability, with fewer voids.

Because flowable composite resin makes exact intraoral reproduction of the prepared wax - up easier, it is thought to be more appropriate for use with a transparent silicone index. In certain research experiments with traditional composite material, the operator had to exert significant external pressure on the index to accurately replicate the tooth morphology. Flowable composite is the preferred material for injectable composite resin technology due to its favorable consistency for injection via the index, good marginal adaptability, and better physical qualities compared to conventional composites. This avoided the flow of resin onto neighboring teeth and reduced the requirement for labor - intensive interproximal adjustments and removal of surplus material following polymerization.

4. Conclusion

This is a novel approach for the closure of multiple diastema in an accurate way with less fatigue for the patient and the operator. Utilizing this technique, it is possible to achieve a marked improvement in esthetics and time can also be

respected. Functional gains may be just as important for steady long - term outcomes as aesthetic rehabilitation. In situations like this one, composite veneers made with injectable composite resin may be more practical, cost - effective, and beneficial than ceramic veneers. Careful planning and preparation of a wax - up can yield good functional results, which can be accurately translated into intraoral restorations with the use of a transparent index.

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