ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 12 | December - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MINIMALLY INVASIVE APPROACH TO ENHANCE ESTHETICS WITH INJECTION MOULDING TECHNIQUE: A CASE REPORT

Dentistry

Dr Himchumi Medhi* Post Graduate, Department of Conservative Dentistry and Endodontics, Regional Dental College, Guwahati, India. *Corresponding Author

Dr Benumith Lepcha Post Graduate , Department of Conservative Dentistry and Endodontics, Regional Dental College, Guwahati, India.

Dr Rubi Kataki Dean, Faculty of Dentistry, SSUHS, Professor and Head, Department of Conservative Dentistry and Endodontics, Regional Dental College, Guwahati, India.

Dr Adrija Deka Reader, Department of Conservative Dentistry and Endodontics, Regional Dental College, Guwahati, India.

ABSTRACT

Advancements in adhesive technology, resin composite formulation design, and creative application procedures have made it possible to address clinical problems that previously required a more aggressive indirect restoration in a minimally invasive, additive, direct technique. Using a transparent silicone index, the injectable composite resin technique is a direct procedure that translates diagnostic wax-ups into composite restorations with the least amount of tooth preparation possible. This case report involves a 35-year-old male patient who presented with esthetic and functional problems associated with spacing. As part of the treatment strategy, composite veneers for the canines and maxillary incisors were planned. After preparing a wax-up, a transparent silicone key was made. Using injectable flowable composite and a clear silicone index, the teeth were restored. This method may be applied to both translational and definitive restorations, and is low-cost and minimally invasive. Careful planning and a meticulous approach can lead to stable and predictable outcome.

KEYWORDS

Composite veneer, esthetic rehabilitation, injection moulding, transparent silicone index.

INTRODUCTION

Modern dental rehabilitation treatment modalities aim to achieve both cosmetic and functional objectives. Direct or indirect final restorations still need a lot of time and effort, as well as highly specialized skills and the clinician's attention to detail [1]. Completing the traditional direct anterior restorations requires a significant amount of clinical labour. Additionally, the technique is less predictable and dependent on the operator because traditional direct restorations do not use established tooth shapes or contours. Clinicians favour indirect restorations when a smile makeover or several anterior restorations are needed [2]. Indirect restorations are usually costlier with delayed delivery [1].

A previous technique named "index technique", outlines the fundamental idea of employing a transparent silicon index to imprint the structure of a wax-up by directly stamping the resin composite onto the teeth's surface using a preheated resin composite.

A more modern method known as the "injectable moulding technique" shares some parallels with the wax-up's "copy and paste" guided approach where a flowable resin composite is used with vents made in the index to attach the tip of a flowable composite to copy and transfer the anatomy [1].

Since Dr. Douglas Terry's work gained widespread recognition, this technique has become more common amongst the dentists worldwide [3].

It is applicable to definitive restorations, aesthetic correction, and provisional restorations for the assessment of occlusal parameter changes over time. In addition, it can be applied to create temporary restorations, replace damaged and cracked dentitions.

Flowable composites are favoured over traditional composites for this procedure due to their consistency, which allows them to fill the mould beneath the silicone index without requiring external pressure on the index. As a result, the issues of index distortion and inadequate results are resolved.

Due to the relatively easy process and ability to predict the morphology beforehand, even in complex scenarios, a predictable outcome can be achieved [3].

By comparison, the injectable composite resin approach is less invasive and more affordable than traditional ceramic veneer [4].

The present report describes the successful use of this technique, with certain modifications, in a case involving a 35-year male patient with esthetic and function problems associated with multiple spacing in maxillary anteriors.

Case Report

A 35-year-old, male reported to the Department of Conservative Dentistry and Endodontics, Regional Dental College with the request to improve the esthetic appearance of his smile. His chief complaint concerned spacing in the upper front teeth region (**Figure 1A-1C).**

The patient wanted to improve esthetics in a conservative way with a treatment compatible with his financial resources. Following an explanation of the various treatment alternatives, he made the decision to proceed with a direct composite veneer.

The VITA classical shade guide was used to select the shade (**Figure 2**). Because of its wear-resistance and high filler load G- aenial Universal Injectable (GC), shade A2 was selected for the present case. For the intended tooth morphology , wax-up was done (**Figure 3**).

Next, a perforated metal impression tray was blocked with modelling wax. The function of the tray is to act as a stent when making the key. To ensure that the silicone could be readily and damage-free recovered in its whole, a full-arch tray was chosen. The stent was then filled with a transparent vinyl polysiloxane material (Exaclear, GC) (**Figure 4**) and placed over the stone model with the wax-up (**Figure 5**).

To prevent possible ripping or deformation that could result in a poor replication of the wax-up in the patient's mouth, care was taken not to press too hard and to ensure that all incisal edges were covered with a sufficiently thick layer.

To make sure the silicone key stays stable in the mouth, it is generally recommended that the silicone key always extend so far that it includes at least two teeth distally from the teeth to be treated on both sides (**Figure 6**).

The G-aenial universal injectable composite tip was used to construct a vent through which the composite was injected. In order to allow trapped air to escape, these vents were placed on the cervical margin of the key and at the centre of each tooth's incisal edge, halfway between the distal and mesial boundaries (**Figure 7**).

Alternate tooth preparation was carried out starting with right canine (tooth #13). Teflon tape were used to isolate neighbouring teeth. Then,

the enamel was etched (**Figure 8**) to create micromechanical retention, carefully rinsed and dried until a frosty appearance of the surface was obtained. A universal adhesive (G-Premio BOND, GC) was applied (**Figure 9**), and light cured.

Positioning the silicone key onto the prepared teeth, the composite was injected. The syringe was placed in the vent previously created on the incisal edge.

When injecting the composite, a small amount of overflow is typically acceptable in order to prevent tiny voids at the edges and interproximal regions. This can easily be verified through the transparent key (**Figure 10**). It was then light cured through it.

The same procedure was repeated on the other incisors and the canine. Further finishing was done with a flame-shaped bur, to correct any possible over contouring followed by polishing. The surface texture of the wax-up was perfectly transferred, giving the teeth an incredibly realistic and natural-looking appearance right away (**Figure 11**).

Figure 1. Pre-operative view of the maxillary anterior segment. (A) Right lateral (B) Frontal (C) Left lateral

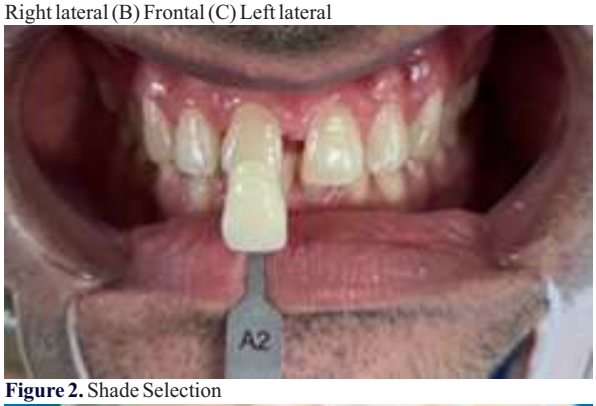

Figure 2. Shade Selection

Figure 3. Fabrication of diagnostic wax-up

Figure 4. Transparent vinyl polysiloxane impression material is syringed onto the impression tray to capture the accurate impression of the wax mock up

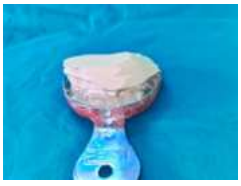

Figure 5. An impression of the prepared wax-up is recorded using transparent silicone

Figure 6. Information of the wax mock up recorded in the key

Figure 7. Creating vent holes in the transparent key with the tip of G-aenial Universal Injectable composite at the incisal edge and cervical margin of each tooth

Figure 8. Etching enamel surface, one tooth at a time, with isolation using teflon (PTFE) tape to protect the adjacent teeth

Figure 9. Bonding agent applied to the etched surface and light cured

Figure 10. Inserting the tip of injectable composite through the incisal vent and injecting composite beginning from the cervical margin

Figure 11. Immediate post-operative view after finishing and polishing. (A) Right lateral (B) Frontal (C) Left lateral

DISCUSSION

The successful application of the injectable composite resin technology for maxillary anterior spacing correction is described in the current case study.

With the help of the injection moulding technique(IMT), restorations with intricate morphology can be easily planned ahead of time and consistently replicated in the clinical setting. Chair time can be saved

by copying the surface texture from the wax-up [3].

Because flowable composite resin makes it easier to precisely replicate the prepared wax-up intraorally, it is thought to be more appropriate for use with a transparent silicone index. Flowable composites show excellent placement characteristics and marginal adaption with fewer voids due to their good wettability on any substrate. These properties can be applied to composite veneers that cover the entire tooth surface, which have a similar physical configuration [4].

Over the past few years, flowable composites' mechanical qualities, strength, wear resistance, polishability, translucency, and other attributes have significantly improved [4].

Recent meta-analysis revealed no statistically significant or clinically significant differences between flowable and conventional composites in any of the outcomes evaluated [5].

Injection molding is a dependable process in part due to the development of appropriate, high-quality materials like G-aenial Universal Injectable and Exaclear. G-aenial Universal Injectable is frequently utilized for this method since it has the good mechanical qualities and consistency [3].

It features a high filler content, complete coverage silane coating of filler particles, wear resistance, and gloss retention [1].

Although the injectable composite resin approach yields low aesthetic results than ceramic veneers, it is significantly more cost-effective, causes minimum loss of healthy tooth structure, and takes less clinical time [4].

Additionally, it demonstrates a simple adhesive procedure for the repair of worn-down and chipped teeth [6].

In the present case, the technique was modified as follows. First, holes were made in the transparent key in the cervical region to prevent air entrapment which will further prevent voids in restoration. Second, minimal tooth preparation was done.

Every method has its limits, and the IMT's are that it works best for restorations with monochromatic composite and layering technique cannot be applied. While finishing is far less than for freehand restorations. Its main benefit after all is the replicated anatomy of a diagnostic wax-up [1].

This is a single case report, and conclusions about the longevity of restoration cannot be made because of the lack of evidence in the literature and long-term follow-up data. However, stable and predictable results can be achieved if this technique is implemented with thorough planning, appropriate case selection, and a careful workflow.

CONCLUSION

Injection moulding technique offers a broad range of indications for both functional and aesthetic rehabilitations. Careful planning and preparation of a wax-up can yield good result with the aid of a transparent index. This technique is more time efficient, and cost-effective in this particular case as compared to ceramic veneers.

REFERENCES

1) Gia, N. R. Y., Sampaio, C. S., Higashi, C., Sakamoto, A., & Hirata, R. (2020). The injectable resin composite restorative technique: A case report. *Journal of Esthetic and Restorative Dentistry*, *33*(3), 404–414.
2) Rathod, P., Patel, A., Mankar, N., Chandak, M., & Ikhar, A. (2024). Enhancing aesthetics and functionality of the teeth using injectable composite resin technique. *Cureus*.
3) Injection moulding technique with injectable composites: quick fix or long-lasting solution? (2023). In *INTERNATIONAL DENTISTRY – AFRICAN EDITION: Vol. VOL.13* (Issue NO. 1).
4) Geštakovski D. The injectable composite resin technique: minimally invasive reconstruction of esthetics and function. Clinical case report with 2-year follow-up. (2019b). *Quintessence International*, *50*(9), 712–719.
5) Ammannato, R., Rondoni, D., Ferraris, F., & AmmANNATO ET AL. (2018). Update on the 'index technique' in worn dentition: a no-prep restorative approach with a digital workflow. In *THE INTERNATIONAL JOURNAL OF ESTHETIC DENTISTRY*.
6) Shaalan, O., Abou-Auf, E., & Zoghby, A. E. (2017). Clinical evaluation of flowable resin composite versus conventional resin composite in carious and noncarious lesions: Systematic review and meta-analysis. *Journal of Conservative Dentistry*, *20*(6), 380.