



Esthetic Rehabilitation of Maxillary Central Incisors: A Simplified Approach

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DOI: 10.5281/zenodo.6469248

Submission Date: 03rd April 2022 | Published Date: 19th April 2022

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Abstract

The paper describes a method for fabrication of anterior class IV composite restoration. The case presented here deals with direct restoration of fractured maxillary central incisors with composite resin using 'Silicone Index Technique'. This method reduces the chair side time and provides superior control of restoration contours as well as incisal edge position. Although more elaborate composite layering techniques exist and may be used in complex esthetic scenarios, a simplified approach combining body shades and implementing basic dental anatomy concepts often will deliver highly acceptable esthetic results. This technique may be used as a routine procedure for doing direct composite restorations such as laminates, Class IV carious lesions and fractured teeth build ups effectively and efficiently.

Keywords: putty index, layering technique, composite, esthetic, bonding

INTRODUCTION

Advances in dental materials and adhesive protocols have expanded restorative procedures available to today's clinicians. For providing enhanced esthetic care to patients, proper treatment planning along with right use of available products is mandatory.

Mimicking variations in teeth opacities and translucencies such that replication of the combined optical properties of dentin and enamel is achieved is one of the main objectives of anterior esthetic direct restorations¹. In small Class III or V restorations, only one shade may be necessary, because composites are relatively translucent; allowing the adjacent & underlying tooth structure to reflect or show through the restoration². Whereas, for larger class III and IV restorations, having no backing tooth structure, a dark background of oral cavity may not be masked by a relatively translucent composite³. For such cases, multilayer technique is recommended.

Class IV lesions require precision and skill to produce right results, as they are one of the most challenging procedures in adhesive dentistry. Creation of esthetics using direct composites for such teeth depends primarily on the following two aspects.

I: RE-CREATION OF COLOUR: Shade selection, layering techniques

II: RE-CREATION OF FORM: Tooth morphology; Line angles; Length and Width; Texturization; Developmental lobes and grooves

This requires a thorough knowledge of theoretical concepts and efficient execution of the same.

Using a case presentation, this article will document the steps required to create a class IV restoration using a simplified layering approach.

CASE REPORT

A child aged 12 years reported to the institution (Sub Divisional Hospital, Zira, Firozpur) with history of fall. On examination it was revealed that left maxillary central incisor had Ellis class III fracture. Right maxillary central incisor

had Ellis class II fracture (Figure 1). Root canal was initiated on left central maxillary incisor while for right central incisor it was decided to wait and watch for symptoms for 15 days. After 7 days, patient reported with sensitivity to both hot and cold in the right central incisor as well. It was tender on percussion, therefore root canal was initiated for the same. It was planned to restore both the teeth with direct composite restoration, as it is an economical and procedure of choice for an adolescent patient. It results in conservation of natural tooth structure. With regular follow up and maintenance, composite restorations have a good life and can serve many a years.

On completion of root canals, access openings on both teeth were sealed with glass ionomer restoration to facilitate ease of retreatment, should the need arise.

The following steps were performed in order to restore the teeth:

STEP 1: PREPARATION OF PUTTY INDEX.

Impression of the jaws were made, models were poured using stone plaster. Mock up wax build up was done on the model, establishing the final incisal edges, lingual form, incisal length and mesiodistal dimensions. On the models with wax build up, impression was made from maxillary canine to canine using heavy body elastomeric impression material.

Once the putty set, it was sectioned labially keeping labio-incisal edge intact with palatal section. The most important cut is the one along the incisal edge bearing in mind that incisal edge has a certain thickness (Figure 2). This ensured we would not end up over contouring facial plane while layering the final increment of composite enabling exact replication of incisal edge and length as created on the mock-up; saving precious clinical time.

STEP 2: SHADE SELECTION

Middle third of the tooth was used for shade selection as it is less affected by intrinsic and extrinsic factors. Using the shade tab provided by the manufacturer; the shade was recorded as A2 body shade.

STEP III: TOOTH PREPARATION

A 1.5 mm 75° functional esthetic bevel was prepared using long tapered diamond bur on the facial. The lingual bevel was a 45° functional bevel. The facial bevel was extended interproximally and towards the gingival surface using a coarse disc to create an “infinite bevel” so as to make restoration margin seamless with the tooth⁴.

STEP IV: ETCHING AND BONDING

Patient had a history of mouth breathing; therefore rubber dam was not used in this case, though that is the ideal requisite for longevity of composite restorations. This case was done using cotton roles for isolation.

Etching of enamel and dentin was done for 30 seconds with application of gel type 37% phosphoric acid (Prevest DenPro, Jammu, India). It was rinsed after 30 seconds; excess water was eliminated using edge of blotting paper. This was followed by application of three coats of bonding agent (GC Solare Universal Bond, GC Corporation, Tokyo, Japan) for 20 seconds using rubbing motion with an applicator tip. It was then cured from both facial and palatal sides⁵.

STEP V: LAYERING TECHNIQUE

The prepared palatal putty matrix was seated in place (Figure 3). The first increment of composite A2 body shade (GC Solare, GC Corporation, Tokyo, Japan) was placed against the palatal putty matrix on left central incisor to create a palatal shell (Figure 4). After light curing the first increment, matrix was removed and mylar strip was positioned to restore the distoproximal contact of the left central incisor by beginning at the cervical extension of gingival bevel, continuing towards incisal edge against the mylar strip. Slowly the Mylar strip was pulled towards the palatal, such that well defined line angle was created prior to light curing⁶. For creating mesial proximal wall and line angle, once again the putty was repositioned along with Mylar strip to replicate midline appropriately, as it contained the indentation of the exact midline between the teeth as created in the mock up. Along with this increment thickness was added in the lingual shell.

Final layer was a one shade lighter A1 body shade (GC Solare, GC Corporation, Tokyo, Japan) for facial aspect of the restoration; extending from facial bevel towards incisal edge and onto mesial and distal contact areas merging with the created line angles.

After completion on left central incisor, steps were repeated on right maxillary incisor (Figure 5). During layering, second increment was used to create mesial and distal line angles simultaneously since mesial contacting surface of adjacent tooth had been created already. Following light curing, third and final increment of composite was placed as a flat layer of resin filling the area between line angles, extending from facial bevel towards incisal edge (Figure 6).

STEP VI: FINISHING AND POLISHING

Finishing and polishing was carried out as five step process:-

1. LONG TAPERED DIAMOND BUR and B.P blade no. 12 was used to remove gross excess of composite.

2. COARSE SOFLEX DISC was used facing downwards towards head of the handpiece to create emergence profile and blend the resin to the tooth interface.
3. COARSE SOFLEX DISC was then used facing upwards to refine incisal edges and embrasures
4. MEDIUM AND FINE SOFLEX DISCS were used respectively creating facial & lingual embrasures.
5. FINE AND SUPERFINE SOFLEX DISCS were used to create a polished surface.

Lingual area was finished with fine diamond and silicone cones (Figure 7, Figure 8).

Figure 9 shows the follow up image of the restorations after 1 month of treatment.

FIGURE LEGENDS

Figure 1: Pre-operative image showing fractured 11 and 21



Figure 2: Preparation of putty index

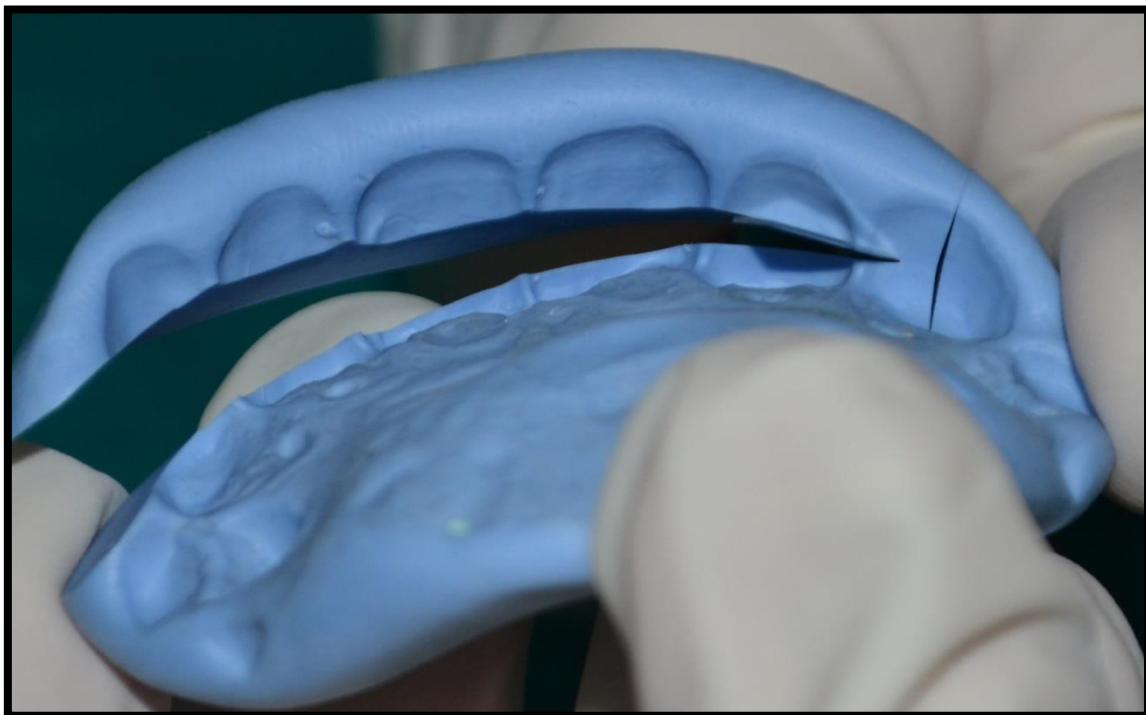


Figure 3: Try-In of the putty index in mouth of the patient.

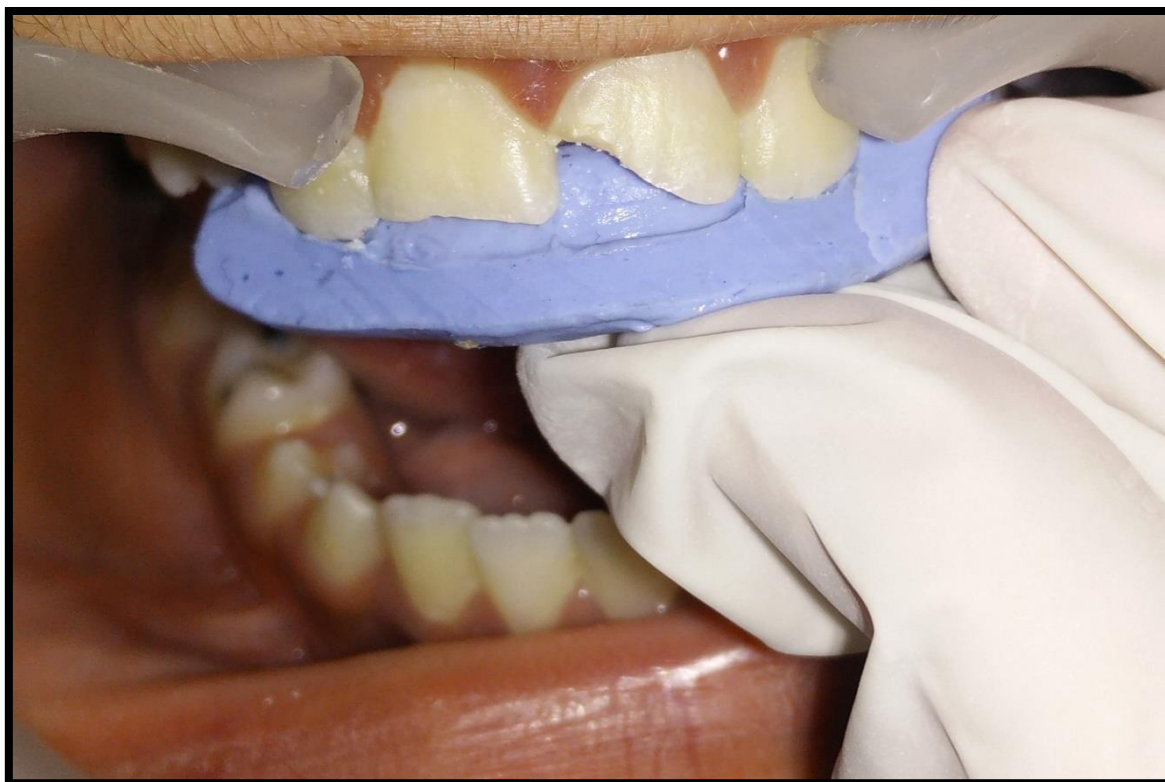


Figure 4: Creation of palatal shell of 21

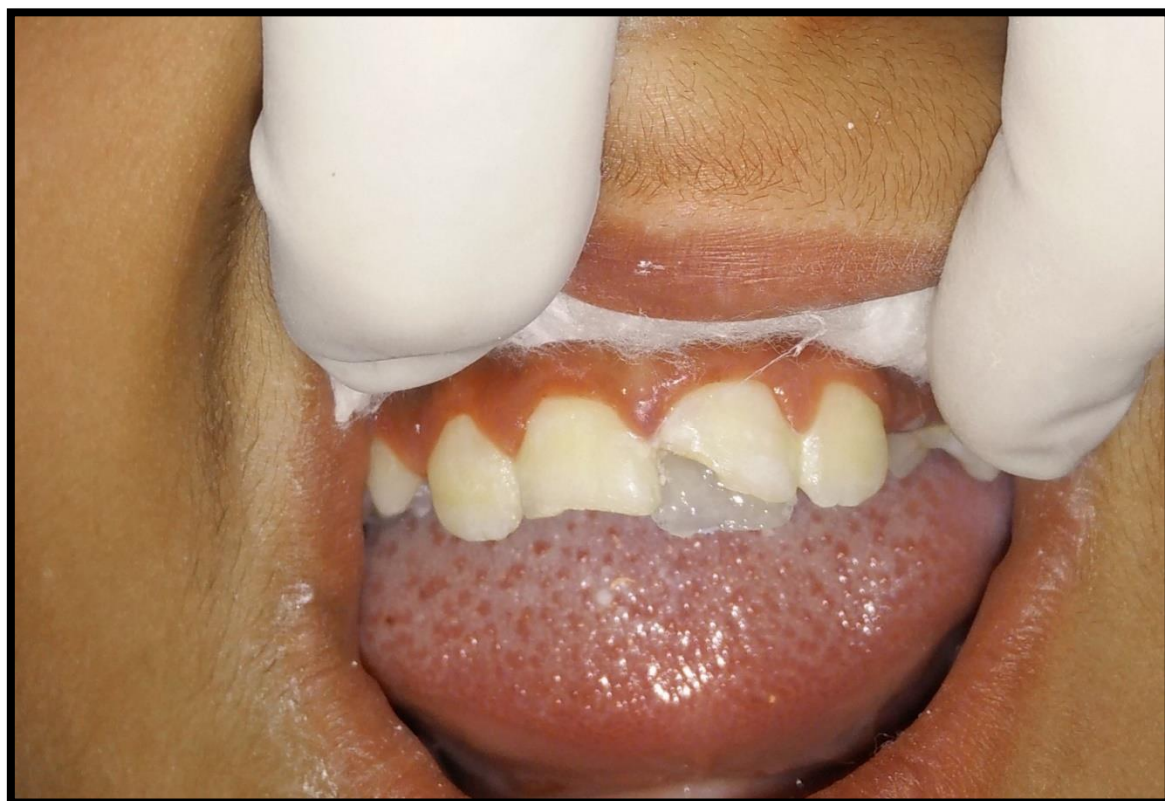


Figure 5: Creation of lingual shell of 11



Figure 6: Immediate post-operative image



Figure 7: Post-operative image after finishing and polishing of restorations



Figure 8: Post-operative image showing passage of Mylar strip through the interproximal contact area of 11 and 21



Figure 9: Follow up image after one month of the restorations

DISCUSSION

CHALLENGES IN CLASS IV DIRECT RESTORATIONS

CHALLENGES	SOLUTIONS
Loss of form and dimension	Create mockup of final form of the restoration on model , followed by putty index
No backing of tooth structure for layering	Putty index becomes a lingual/ palatal matrix against which restoration can be build up
Dark background of oral cavity reflects through the translucent composite	Masked by opaque shades or appropriate layering techniques
Less Surface area available for bonding	Functional and esthetic bevel will help increase surface area
Time consuming procedure	Mock up done on model followed by silicone index will decrease actual clinical time
Reproduction of tooth morphology	Comprehensive understanding of tooth shape, colour, and tooth's natural optical properties is essential for the clinician; develop skills with practice

Treatment planning in esthetic dentistry involves harmonious integration of material selection, shade creation, layering technique selection for building up of natural lifelike form and color of lost tooth structure.

Class IV restorations involving maxillary central incisors are very demanding and technique sensitive as maxillary central incisors are the visual focal points for the smile. Buildup of central incisors involves keeping 'principles of smile design' in mind. The golden proportion is the guiding principle for creating the form (width and length) of the tooth in harmony with adjacent teeth and overall facial aesthetics. Apart from this, in depth knowledge of polychromatic nature of teeth, interplay of color (hue, value, chroma) of enamel and dentin and optical properties of the restorative materials being used is of utmost importance. Texture and surface anatomy of teeth are created in an age appropriate manner.

In every restorative treatment a lot of aspects have to be controlled at once such as shape, occlusion and incisal edge position. The use of the silicone index ensures excellent control over many aspects during treatment. The palatal silicone index is an impression of the wax-up intended for transferring that information into the mouth during treatment. The desired extension of the material depends on which teeth being treated.

The matrix always rests on the occlusal plane of teeth that will not be treated in order to have the stability of the matrix guaranteed during treatment.

In this case the matrix was extended over the premolars. Benefits of using the putty index are as follows:

- FOCUS ONLY ON APPLICATION OF COMPOSITE LAYERS
- TWO SAGITTAL DIMENSIONS ALREADY PERFECTED : LENGTH & INCISAL EDGE POSITION
- FINAL OCCLUSAL AND ESTHETIC ADJUSTMENTS WILL BE MINOR AND FAST
- INCISAL THICKNESS
- MOCK UP APPROVAL
- SAVES CHAIRSIDE TIME

Total etch technique was used as more than 75% restoration was to be bonded to enamel.

The adjacent teeth in this case did not display characteristic incisal third translucency or halos. The middle third of these teeth were used for shade selection using the shade tab provided by the manufacturer. The cervical third of a tooth is affected by surrounding gingival tissue which adds red/pinkish hue to existing dental shade. Incisal third of the tooth is affected by presence of different intrinsic opacities and translucencies.

Since the adjacent teeth of the patient did not display too much of cervical to incisal colour variation or any characteristic staining pattern, it was decided to go in for simplified layering approach to restore both the central incisors⁴. Symmetry could be ensured in terms of shade matching for both the teeth as both the central incisors required buildup of incisal thirds. A simplified layering approach is a 2- shade layering technique. According to Vargas, if the adjacent teeth or the tooth to be restored in a through and through preparation is polychromatic in nature and no incisal translucency or halo is evident, the tooth may be restored with two shades of composite resin; otherwise translucent or white opaque shades are indicated to restore the incisal translucency or halo effect⁷. It has been stated by Romero et al that once the decision is made to use more than one shade, the clinician needs to know the level of translucency of composite resins being used³. For this, they suggested fabricating two discs of 1mm and 2mm thickness of the composite resin to be used the lingual layer. These discs must be placed on a white background with a black stripe. This allows the clinician to see how much thickness of composite resin is necessary to mask the dark background of oral cavity. Same technique was used for this case as well.

GC Solare composite was selected for its optical properties. A2 shade universal composite was chosen for lingual layer in a thickness of 2mm. This was layered on top with higher value A1 shade universal composite. Only two shades of composite were used in this case, but the placement was done sequentially using 3-4 increments to allow buildup of natural contours. After creating lingual shell, second and third increments were used to recreate the mesial and distal line angles. Final increment was used to create the facial surface.

CONCLUSION

This article focuses on two key aspects of Class IV restorations i.e. making a palatal silicone index and utilising a simplified 2 shade layering approach to create life like aesthetics. It is noteworthy that this patient was treated at a primary government health centre of a rural area with limited resources available at hand. The treatment carried out justifies the financial capacity of the patient while not compromising on any of the aesthetic and functional aspects.

To summarize the benefits highlighted in this paper are as follows:

- Easy and simple approach
- Economical
- Possible in set ups with minimal facilities
- Patient compliance is good
- Less number of visits
- Reduced chair side time
- Basic composite kit was used

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CITE AS

Dr.Shikha Sharma. (2022). Esthetic Rehabilitation of Maxillary Central Incisors: A Simplified Approach. *Global Journal of Research in Dental Sciences*, 2(2), 1–9. <https://doi.org/10.5281/zenodo.6469248>