

Cuspal Layering Technique To Produce Biomimetic Posterior Restorations-A Case Report

INTRODUCTION:

Composite resins occupy the paramount position among restorative materials for they offer exemplary esthetic potential and acceptable longevity, with much lower cost than equivalent ceramic restorations of the teeth^[1,2]. Layering of composite restoration started with the development of light curing technology and the launch of optically structured composite systems, offering various materials opacities, translucencies and shades, integrating for the first time in 1991 VITA shades into direct restorative system. Composite restoration allows for minimally invasive or no preparation at all when assuming the replacement of decayed or missing tissues which gives thinking to new concept called Bio Esthetics^[3].

Today is the era of 'Bio-mimetic dentistry'. 'Bio-mimetic' literally translates to mimicking nature. With the advent of introduction of newer techniques and materials the results are only getting better having the extraordinary esthetic outcome.

However, manually crafting an esthetic direct composite restoration is a technique that requires experience, skill and finesse.

CASE REPORT:

Case Presentation: A 40-year-old female patient reported to the department complaining of decayed tooth in lower right posterior region of jaw. An oral examination revealed moderate Class I caries on 46 with the marginal ridges still intact, so a direct cuspal coverage restoration with composite resin was planned (fig A). The patient expressed the desire to restore tooth 46 with a direct RBC (Resin Bonded Composite) restoration due to cost considerations. A finalized treatment plan was accepted, and informed consent was secured from the patient.

Restorative Procedure:

A single tooth rubber dam (*nic tone*) isolation was done on 46 tooth. The cavity preparation was done in a very conservative manner; removing caries (soft leathery dentin) with a #245 bur and rounding the internal sharp line & point angles with a #2 and #4 tapered fissure bur. After gross caries removal (fig B), Caries disclosing dye (*Caries indicator dye -Prime dental*

products) was applied with the help of applicator tip (fig-C). After waiting for 20 secs the dye was then rinsed & cavity was dried. Remaining Caries was excavated using a spoon excavator (*Hu -Friedy*) (fig-D). The cavity preparation was disinfected using a 2% chlorhexidine antibacterial solution. As the depth of cavity preparation was found to be greater than 3mm, a layer of calcium hydroxide (*Dycal-Ivory*) was applied as a liner (fig-E) followed by a layer of conventional GIC (*GC Universal Restorative GIC*) as a base (fig-F). After that the selective etching technique was carried out by using a 37% phosphoric acid (*D-Tech*). After 1 minute, etchant was removed by water spray and the cavity was air dried with 3-way syringe. Then the bonding agent (*Palfique Universal Bond*) was applied on enamel and dentin surface with the help of applicator tip. The bonding agent was gently air thinned until its milky appearance disappeared. It was light cured for 20 second (fig. G). Shade selection was done using Black & White pictures which were taken with the help of a DSLR (*canon*) and a 100 mm focal length Macro lens (*canon*). Dentin shade(A3) and Enamel shade(A1) was selected (*Palfique LX-5*). In Dentin layer, the first wedge shaped increment of composite was placed on disto-buccal cusp (fig-H) and cured for 20sec, which was followed by mesiobuccal, mesiolingual and distolingual cusp subsequently following the anatomy of the tooth(fig.-I) Each increments were cured by 20 seconds. The key point to remember is that while layering every cusp to leave a sharp groove between the two increments to resembles fissures in which tints can be flown. These sharp groves define the anatomy and give a crisp appearance of the cusps differentiating each cusp from the other. Tint (*Kolar+Plus: Kerr, Corp*) (brown colour) was applied on the grooves and fissure area with the microbrush cusps (fig. J). A minimum of 1 mm space was required for translucent Enamel layer. Then Enamel shade (A1) was applied starting with the mesiobuccal cusp followed by each successive cusp. The Composite was condensed and sculpted against the Cavo surface margins with Style Italiano instruments (*Fissura & Condensa*) highlighting the special references for more accurate occlusal anatomy. Each increment was cured for 20seconds to avoid microcrack formation.

As most of the occlusal surface was missing, distinct attention was paid in creating appropriate and correct anatomy, using proximal and facial surfaces as special references. Each cusp was built-up separately, and translucent enamel layers were applied to the final contour on the occlusal enamel surface with a successive cusp build-up technique.

The rubber dam was removed, the occlusion was checked, and the restoration was finished using the Shofu Super snap mini kit. Polishing was done by polishing paste and cotton buff and final restoration is achieved (fig. K)

DISCUSSION:

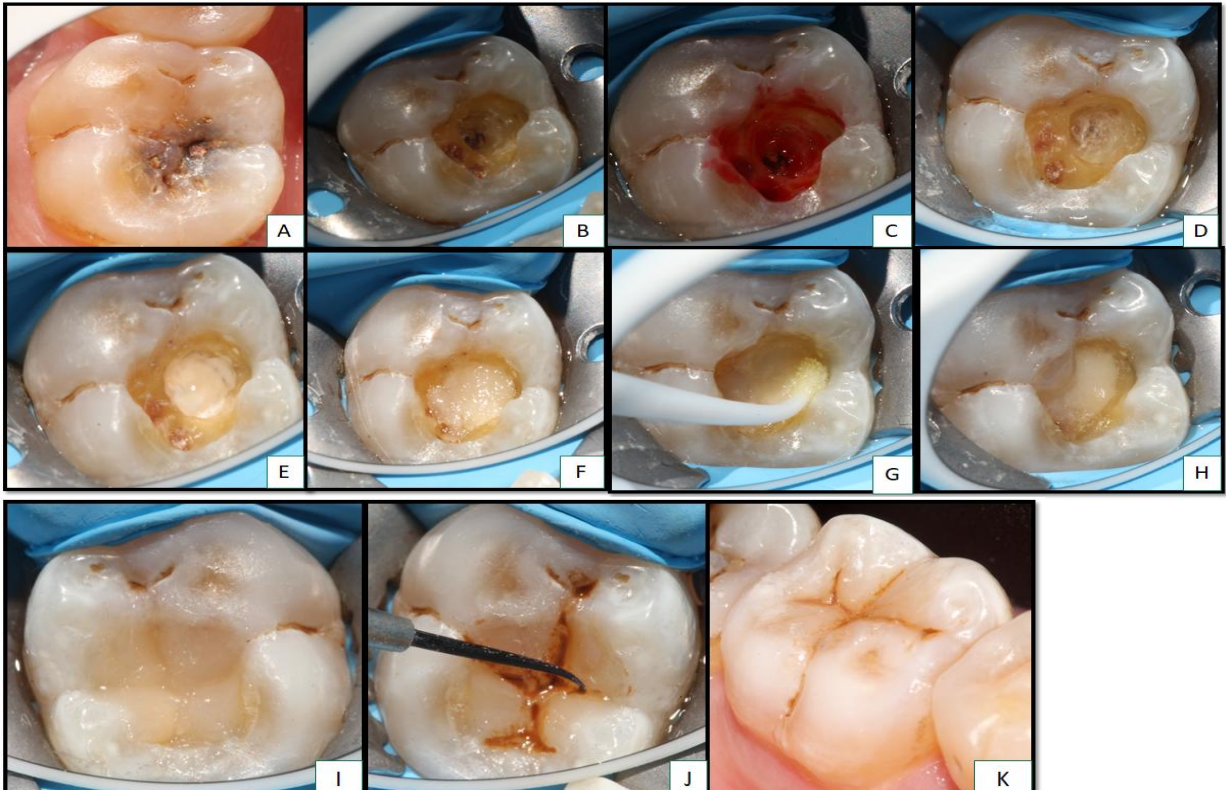
In this context, the application of wedge-shaped increments of resin composite was of paramount importance, resulting in a final total decreased C-factor ratio and decreasing the polymerization shrinkage (Feilzer, de Gee & Davidson, 1987)^[4]. Direct composite restoration has lower cost, reduced chair-time and sound tooth structure will be preserved.

CONCLUSION:

Clinicians tend to focus on tooth form and function when evaluating the success and failure of posterior resins, the emphasis must remain in advancing our understanding and knowledge of the intricate and complicated characteristics of the restoration–tooth interface^[5]. Today composites are available in different enamel ,dentin ,body shades with Tints and Opaquers with good optical properties of material. Applying the optical physics of dentin in relation to composite shades available and restoring them and make them invisible is an art.

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(Fig-A)-Pre-operative occlusal view, (Fig-B)-After gross caries excavation, (Fig-C)-Application of Caries Indicator Dye, (Fig-D)-After complete excavation of caries, (Fig-E)-Application of Dy-Cal,(Fig-F)-Application of GIC as base,(Fig-G)-Dentin bonding agent application,(Fig-H)-Disto-buccal cusp build up, (Fig-I)-Successive Cusp build up in dentin layer,(Fig-J)-Application of Tints,(Fig-K)-Post-operative occlusal view.

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I / We certify that I/we have participated sufficiently in the intellectual content, conception and design of this work or the analysis and interpretation of the writing of the manuscript, to take public responsibility for it and have agreed to have my/our name listed as a contributor. I/we certify that all the data collected during the study is presented in this manuscript and no data from the case report has been or will be published by the editors, I/we will provide the data/information or will cooperate fully in obtaining and providing the data/information on which the manuscript is based, their assignees.

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1. Dr. Suwidhi Ranka ~~Ranka~~
2. Dr. Ajay Singh Rao ~~Rao~~
3. Dr. Nimisha Shah Nimisha
4. Dr. Jaimini Patel ~~Patel~~

(up to four authors for case report)

