A Basic Evaluation of the Layering Technique Using Color Modified Nano Filler Composite Resin

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Abstract: In some case of large defects, such as those with Class III or IV cavities, even when a composite resin is selected to match the tooth color, the background color sometimes shows through the resin and the restoration in the mouth appears darker than the natural teeth. The layering technique is effective to block the background color, but there have been few basic studies on it in composite resin restorations. In a preceding study, we reported the usefulness of the layering technique by developing a basic experimental system similar to those used in clinics, using the Vitapan Classical shade guide for the direct application of nano filler composite resin to experimental teeth with standardized cavities. In the present study, we objectively assessed some layering techniques using color modified nano filler high-cured composite resin: Filtek™ supreme DL universal restorative (3M ESPE) in the same color as the Vitapan Classical shade guide.

Standardized cavities were prepared in the experimental teeth of the Vitapan Classical shade guide, and layerings were applied with opaque shade composite resin and body shade composite resin. Then, a colorimeter was used to measure CIE1976 L*a*b*, XYZ values and then calculate ΔE*ab, contrast ratios and TP values.

The results were as follows:

1. According to the ΔE*ab, when the tooth color was A2, the layering technique with OA3+A2 was effective. When the tooth color was A3, the layering technique with OA3+A3 or OA4+A3 was effective. When the tooth color was A4, no significant difference was observed between the OA4+A4 layering technique and A4 single-layer filling.

2. The TP values and contrast ratios suggested that the transparency may increase with a single-layer filling only using the body shade, allowing the penetration of the background color.

3. Compared to the nano filler composite resin used in the previous experiment, the color modified nano filler composite resin showed better compatibility.

Therefore, when a layering technique is used in composite resin restorations, an esthetically favorable restoration can be achieved by selecting an opaque shade which is similar with or slightly darker than the natural tooth color and then applying a body shade in a color similar with the tooth to be restored.

In addition, it was suggested that the colors may not match when the value of the tooth is low and an opaque shade of greater value is selected.

Key words: Layering technique, Composite resin, Color fitness