Step-by-step for class IV restorations

11 Jan 2017

The use of composite resins for anterior teeth restoration is a procedure that demands from the clinician a special commitment, from the planning to execution, combining art and science using a minimal invasive approach that allows more tissue preservation with optimal aesthetic and functional outcome.

The polycromatic complexity and color selection of the restoration is one of the most challenging stages, the optical features of the dentin, enamel and their simultaneous coexistence are the ones that determine the final color of the tooth. Stratification techniques have as an objective to reach the color from the inside to the outside through the combination of dentin and enamel composites, chromatic and achromatic, effects, using small increments in each layer of the restoration.

Dental color has as well a direct relation with the surface texture, a tooth with a whiter appearance is strongly linked with a richer surface detail which makes light reflect more and in different direction, compared with a tooth that has a smoother surface, which will make it of a darker appearance.

A source of constant illumination (5500ºK) and a photographic evaluation of the teeth to be restored will provide more information regarding color and will allow to detect important details as the limit between enamel and dentin, and the different color characteristics of the natural teeth.

A simple way of selecting color for a restoration is the following: observe the cervical third to obtain the color of the dentin, the middle third to obtain the color of the chromatic enamel and observation of the distal, mesial and incisal margins for choosing the achromatic enamel.

Upper central incisors are the most prone to coronal fractures and constitute one of the most frequent dentoalveolar trauma in the permanent dentition. The type IV lesions can be seen by loosing the incisal edge, the middle third, involving or not the incisal angles, after the pulp and periodontal evaluation, we should decide the restorative therapy to follow.

In the following pictures a Class IV fractures case on 11 and 21 restored with composite resins will be presented with a simple protocol at the reach of everyone.
Fig. 1 – Initial situation, incisal third fracture of teeth 1.1 and 2.1

Fig. 2 – Clinical picture for planning shape and color of the future restoration; for the color matching process a reference was taken in the central part of the cervical area of the tooth thus obtaining the color of the dentin shade (hue and chroma), after that, the color of the chromatic enamel was obtained in the central area of the tooth (value) and finally from the proximal areas and the most incisal part available the achromatic enamel shade was selected (Opalescent effects).

The selected resin shades were A3,5 Dentin, A2 Enamel and Trans 20 (Empress Direct Ivoclar Vivadent)
Fig. 3 – This image was digitally modified in order to observe more details as the enamel-dentin limits and some natural features, contrast was augmented by +60% and brightness reduced by -60%, that allowed a better perception of the color characteristics.

Fig. 4 – Initial study model and planning wax-up for 1.1 and 2.1, buccal view
Fig. 5 – Initial study model and planning wax-up for 1.1 and 2.1, palatal view

Fig. 6 – Palatal stent construction, which was trimmed in mesio-distal sense preserving the incisal edges, transferring this way the information obtained in the wax-up. This index will be used for the mock-up.
Fig. 7  Img. 7 – Direct mock-up with composite resin, this was achieved with the primary silicone index obtained from the wax-up

Fig. 8  Img. 8 – After corrections and adjustments done in the direct mock-up and after solving all the aesthetic
requirements of the patient, we obtained a second and definitive silicone stent, more accurate and precise.

**Fig. 9**  
Img. 9 – Rubber dam placement for absolute isolation from first premolar to first premolar
Fig. 10 – Silicone stent adaptation, trimming of the excess especially in the areas near the clamps and gingival papillae, verifying the correct insertion and stability.
Fig. 11 – Teeth preparation, surface cleaning with 2% chlorhexidine, irregular and non supported prisms removal, 2-3 mm fine bevel preparation using a diamond bur #2135 (bevel should be as long as the fracture extension) and afterwards the finishing of the preparation with coarse and medium abrasive discs.

Fig. 12 – Palatal wall build-up: when restoring fractured teeth we usually start from the palatal wall when we have a silicone stent, we use a high transparency composite as the achromatic dentins (Trans 20 Empress Direct, Ivoclar Vivadent) or effect enamels in very thin layers; we apply the resin over the stent in a homogeneous way and place it in the cavity, adjust it and polymerize it, many times we reinforce this wall with a small amount of flowable resin before removing the stent.
Fig. 13 – Removal of resin excess with abrasive discs, scalpel blade or diamond bur at low speed without water, in order to achieve a well defined and clean perimeter.

Fig. 14 – Opaque composite resin applied in the incisal edge to create the halo effect (in this case is the same shade used for the dentinal body) to create the counter opalescence present in natural teeth without altering the
width or length of the planned restoration (A3.5 Dentin, Empress Direct Ivoclar Vivadent)

Fig. 15 – A3.5 Dentin (or opaque mass) application (Empress Direct Ivoclar Vivadent) over the palatal wall to start the reconstruction of the dentinal body, reproducing a slight convexity which has more volume on the medium third and covering the bevel partially decreasing the volume towards the incisal. With the help of an explorer or a sharp instrument we start shaping the mamelons, maintaining a small space for the incisal effects with the transparent masses.
Fig. 16 – The small space between the mamelons and the incisal halo will be covered with a special effect (opalescent) Trans 20, slightly covering the mamelon tips.

Fig. 17 – Once the body of the restoration is shaped, we will apply a chromatic enamel A2 (empress direct, Ivoclar Vivadent) over all the surface for the restoration.
Img. 18 – Application of achromatic resins in certain areas as the margins or the mesial and distal lobes will allow us to modulate the value and the opalescence of the restoration, achieving this way a better refraction index, more similar to the natural enamel and improve this way the morphology of the restoration.

Img. 19 – Finishing and polishing stage with abrasive discs for the perimeter and diamond burs for the texture and micro texture of the buccal area. Afterwards abrasive rubber tips.
Fig. 20 – Secondary anatomy highlighting the lobes and depressions of the buccal surface.

Fig. 21 – Microtexture
Fig. 22 – Immediate postoperative picture, dehydrated teeth; a second session is required for the final polishing and integration assessment of the restoration.

Fig. 23 – Five days after, final polishing with felt discs and aluminum oxyde paste, corroborating the shape and color integration.
The main goal of performing direct restorations with composite resins is to handle an easy workflow that allows the clinician to have a predictable, natural, functional and long lasting result. Composite resin is a tooth-friendly material, and it allows a
minimally invasive approach; color selection is always a challenge for the clinician, in the present article, a simple method is proposed and on top of that, a digital method to enhance the present characterizations of the natural teeth. Combining science and art and the thorough observation of the natural details must concern the clinician from the beginning to the very end. Said that, a constant quest for natural aesthetics together with a continuous evolution of the adhesive systems and dental materials allow the professional to achieve aesthetic results for long term restorations.