Designing real smiles with digital tools

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Dental materials and clinical procedures have changed dramatically in the last decades. Probably the main advances that have occurred during the last two decades have been in the fields of implantology and adhesive dentistry, but the main revolution is the development of digital dentistry. Although these changes have certainly made diagnostics and certain procedures easier, the basics, such as function and the biological aspects, remain essential. At the same time, we have experienced major improvements in ceramics and composites, helping us to fulfill our patients’ aesthetic demands.

A basic prerequisite for these indications is an in-depth understanding of the facial and dental aesthetic parameters. The clinician needs to understand the challenges that each clinical case presents and has to be able to develop an appropriate treatment plan that approaches the case from a multidisciplinary perspective. Tooth proportions need to be considered in relation to gingival tissue. A tooth proportion needs to be considered in the gingival zeniths are clearly not the most beautiful direct veneer if the gingival zeniths are clearly not the most beautiful direct veneer if considered in relation to gingival tissue.

Figure 3 shows the intra-oral view, and the setting is a dental practice. Photographs are taken with digital tools, one with minimal training. Recently, new software has been released that simplifies the procedure even more. DSD software for iPads (www.digital-smiledesign.com). The procedure is based on overlapping certain areas of the teeth in the manner previously described. The result can be seen in detail in Figure 12 and the display in Figure 13. Figure 14, the results of the traditional mock-up and the digital mock-up can be seen in Figure 14. Traditional indirect mock-ups are made from a previously created wax-up from the laboratory.

The next step was to analyse the patient from the facial perspective based on the details of her teeth. The digital smile design (DSD) concept diagnoses aesthetic problems from a facial perspective and, based on a simplified digital analysis of a few photographs, proposes treatment options and assists with communication between the various specialists in the team. The first step is to draw a horizontal and a vertical line. The photograph is centred, moved and rotated until the bi-pupillary line is horizontal.

A photograph from the 12 o’clock position is used for the analysis of the labio-palatal position of the teeth and superimposed on to the analysis done previously (Fig. 11). Once the clinician is clear about the treatment possibilities and limitations, a digitally designed mock-up can be created. This procedure reduces chair time dramatically and increases patient acceptance. Owing to easily accessible software such as Microsoft PowerPoint and Keynote, these effects are easily and quickly created by anyone with minimal training. Recently, new software has been released that simplifies the procedure even more. DSD software for iPads (www.digital-smiledesign.com). The procedure is based on overlapping certain areas of the teeth in the manner previously described. The result can be seen in detail in Figure 12 and the display in Figure 13. A comparison from the facial perspective between the pre-operative situation, the traditional mock-up and the digital mock-up can be seen in Figure 14. Traditional indirect mock-ups are made from a previously created wax-up from the laboratory.

First, an impression is taken and a stone cast is then fabricated. Afterwards, the technician waxes the necessary teeth depending on the instructions given by the clinician. The next step is taking an impression from that wax-up. The excess is removed and a flowable self-curing composite material (usually bis-acrylate-based) is applied to the alveolar guide and then placed in the patient’s mouth. After a few minutes, the excess is removed and the patient is able to see the changes and the clinician is able to evaluate the proposal directly in the mouth. Generally, photographs are taken of the new situation and analysed. The option of a digital mock-up is much simpler. Once the final forms have been created, a photograph is superimposed on to them, and the texture of the new teeth is created. As seen in Figure 14, the results of the traditional and the digital methods are similar.
and it is difficult to differentiate between them.

The protocol is based on photographs and videos that are taken during the first appointment. The analysis is performed, and eventually the case is discussed with the team if necessary. Once the presentation is ready, the treatment plan is presented in a visually attractive way to the patient (Fig. 15). Finally, whether to use ceramic or composite restorative materials is considered depending on different factors. Our philosophy is based on the minimally invasive concept. As long as we can provide the patient with the same aesthetics, durability and predictability of ceramics, we will select composites.

In cases in which many teeth are involved, multiple diastemas are present or occlusal imbalances may jeopardise a successful outcome and major changes need to be made, our choice leans towards ceramics. Whatever approach is chosen, it is of paramount importance for the clinician to understand the ceramic and/or composite system he or she is using. In this particular clinical case, the ceramic system used was IPS e.max Press and the composite system was IPS Empress Direct (both Ivoclar Vivadent) because of its simple layering concept, its natural-looking shades and long-lasting gloss. The correspondences between the shades of both systems make them easier to combine.

Once the treatment plan has been accepted by the patient, the treatment begins with preparation and demarcation in order to be as conservative as possible (Fig. 16). Figure 17 shows the detail of the hypomineralised areas of the mandibular lateral incisors. The areas were excavated with a redcoloured bur (Komet Dental) and etched with phosphoric acid Excite F (Ivoclar Vivadent) was used as a bonding agent, and IPS Empress Direct Dentin A1 and Enamel A1 were placed using a novel instrument called OptraSculpt Pad (Ivoclar Vivadent).

The maxillary teeth were prepared and impressions taken. Figure 20 shows the six veneers fabricated by master dental technician Victor Romero (Santiago, Chile). Then they were tried-in with a specially designed glycerine-based paste components of the Variolink Esthetic cementation kit (Ivoclar Vivadent). Figure 21 shows how dramatic the change in value can be with this type of cement. This procedure is especially helpful when one or two veneers are seated, and the value needs to be slightly corrected in order to match them to the adjacent teeth. The veneers were then-bonded and the final result can be seen in Figure 22, where the preoperative situation is shown against the similar results achieved with the digital mock-up compared with the final outcome. Figures 23 and 24 show the integration of the six maxillary ceramic veneers and the two direct composite restorations performed on the mandibular lateral incisors at the three-month follow-up. All this work was integrated from the facial perspective, as seen in Figure 25. The satisfied and spontaneous patient can be observed in Figure 26.

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