

# Esthetics in the anterior maxilla: a team-oriented approach

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**Multidisciplinary collaboration plays a significant part in achieving predictable treatment results. This article raises awareness of the importance of accurate case analysis and preoperative planning.**

This case report describes the reconstruction of two lost central incisors in the anterior maxilla. After tooth 11 was extracted, measures for preserving the alveolar ridge were performed. After eight weeks, an implant was placed and a screw-retained temporary bridge was fabricated. Prior to inserting the temporary bridge, tooth 21 was extracted and immediately replaced by an implant.

## Introduction

The impending loss of a tooth in the esthetic zone can be a distressing experience for the patient.<sup>1</sup> As the success rates and predictability of dental implants have improved over the years, implant-based treatments are gaining in popularity.<sup>2,3</sup> Osseointegration is no longer the only criterion for successful implant therapy; the esthetic outcome of the implant reconstruction is also important. An esthetic implant restoration may be defined as a restoration that is in harmony with the perioral facial structures.

The esthetic peri-implant tissues should be in harmony with the healthy surrounding dentition in terms of height, volume, shade and contours. The restoration should imitate the life-like appearance of the missing tooth in terms of shade, shape, structure and size as well as the optical properties.<sup>4</sup> In a multidisciplinary team approach, several treatment modalities such as minimal invasive methods, ridge preservation protocols, connective tissue grafting, provisionalization and plastic-esthetic periodontal surgery should be considered. In addition, a thorough analysis, e.g. with the Digital Smile Design, is crucial.<sup>5</sup>

## Case report

A few years ago, both central incisors of this young male patient were restored with metal-ceramic crowns. From today's perspective, the restoration must be categorized as an esthetic failure (Fig. 1). Both teeth showed significant amounts of gingival recession, visible crown margins and a loss of harmony between the gingival architecture and the restoration. The treatment plan was to replace the two central incisors by two implants with screw-retained monolithic lithium disilicate crowns. To create a harmonious esthetic appearance, the two lateral incisors would be built up with composite material.

## Surgical phase

The initial assessment resulted in a treatment plan where both incisors were to be replaced by implants (NobelActive, Nobel Biocare). In order to maintain the central papilla between the incisors, a gradual extraction of the two teeth was performed, starting with tooth 11. A few



*Figure 1: Disharmonious transition between the gingival margin and the PFM crown. The "collapse" of the emergence profile at site 11 is clearly visible.*

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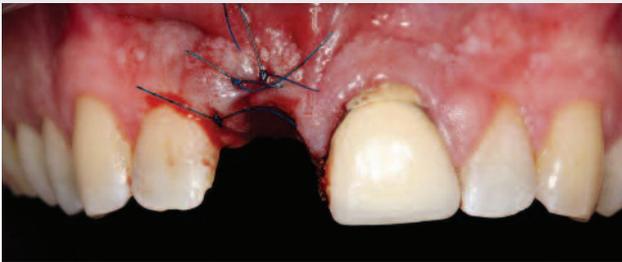


Figure 2: Eight weeks after extraction of tooth 11: convex contour of the alveolar ridge and preservation of the soft tissue.



Figure 3: After insertion of the implant at site 11. Ten weeks later, an impression was taken and a temporary bridge with an extension for site 21 was fabricated.



Figure 4: The second implant was placed immediately after extraction of tooth 21.



Figure 5: The temporary bridge with the extension for site 21 was screwed to implant 11. After two months, the buccal contour at the site of 21 was corrected with a connective tissue graft.

weeks later, tooth 21 was extracted, followed by immediate implant placement. A temporary bridge with an extension as tooth 21 was fabricated in order to contour the soft tissue. Figures 2 to 5 show the surgical phase aimed at preserving the soft tissues.

**Prosthetic phase**

Preserving the soft tissue plays an important part in the success of the treatment. Transmitting these data to the dental technician presents a challenge.<sup>6</sup> To replicate the soft tissue architecture, a standard impression coping on implant 11 was individualized. Then, an impression was taken of the implants at site 11 and 21 using an individualized and standard

impression coping respectively (Figs 6a and b). The resulting plaster model was modified by grinding at site 21. Then, a silicone impression material was used to record the emergence profile of pontic 21 of the temporary bridge (Figs 7a to c). This information was transferred to a standard impression coping, which resulted in an individualized impression at implant site 21 (Figs 8a and b).

At the next step, the situation was assessed using a DSD analysis (Figs 9a and b). The evaluation revealed a disproportionate distribution of volume between the central and lateral incisors. The lateral incisors were too narrow compared with the wide and square shape of the central incisors. In order to enhance the harmony, the volume should

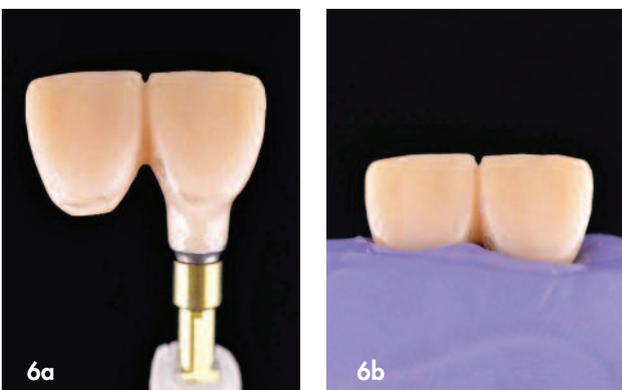


Figure 6a and b: Fabrication of the individualized impression coping for the implant at site 11. The emergence profile of the temporary should be transferred to the final restoration. This procedure prevents the emergence profile from “collapsing” during impression taking.

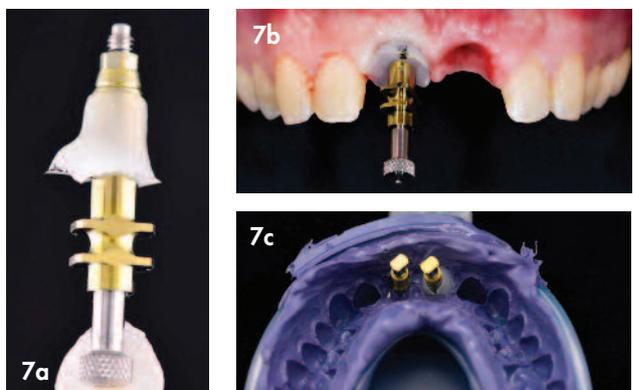


Figure 7a to c: Impressions of the implants at site 11 and 21 with an individualized and standard impression coping and the model fabricated on the basis of these impressions.

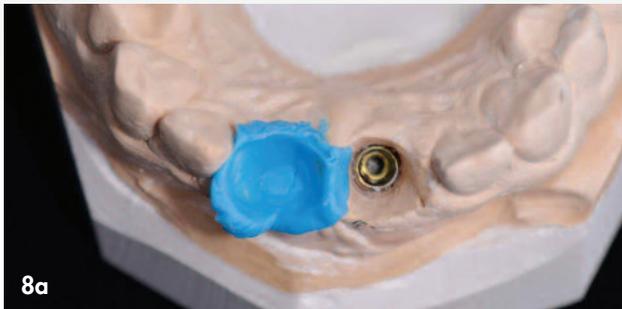


Figure 8a and b: Implant model. The basal region at site 21 was modified by grinding and the emergence profile of the pontic at site 21 of the temporary bridge was recorded using silicone.

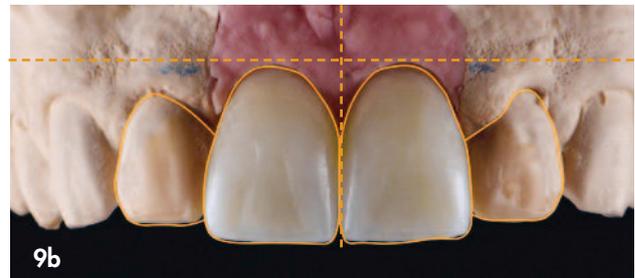
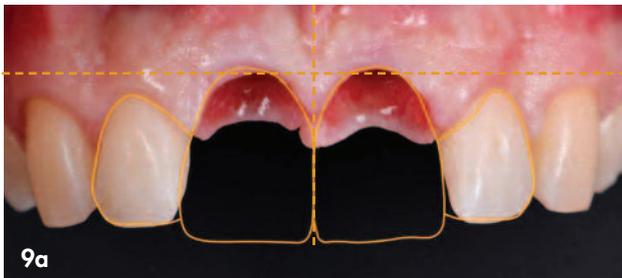


Figure 9a and b: Analysis and planning using the Digital Smile Design method. Compared with the lateral incisors, the central incisors were too wide. The entire volume should be distributed across the four anterior teeth.

be distributed across the four incisors. New screw-retained temporaries were fabricated. Prior to this, a wax model was adapted and tested intra-orally to visualize the outcome.

A silicone key was created to first build up the lateral incisors with a temporary composite material.<sup>7</sup> With the temporary crowns and the composite mock-up of the lateral incisors, the shape of the wax-up could be transferred. This “blueprint” served to evaluate the “new smile” intra-orally prior to fabricating the permanent restorations. Shade selection was performed with the help of cross-polarized light. Unwanted reflections were effectively eliminated with a polar eye filter. To fabricate the final prosthetic restorations, the temporaries were duplicated and 1:1 copies were made using IPS e.max® Press (monolithic lithium disilicate).

Screw-retained IPS e.max Press crowns were placed on the implants and the screw openings were filled with Teflon (PTFE) and covered with composite. Once the restorations were placed, the lateral incisors were built up with IPS Empress® Direct composite. A palatal matrix made of silicone putty was used as an auxiliary. The shade match of the chosen composite and the IPS e.max ceramic was deemed ideal. A rubber dam was used for isolation (OptraDam® Plus).

A composite stratification technique was used to build up the incisors (Fig. 10). The enamel was slightly roughened, etched (37% phosphoric acid, 15 seconds, total etch) and then coated with a light-curing adhesive (Adhese® Universal). The adhesive was scrubbed into the bonding surface and then light-cured

(Bluephase® Style). First, the palatal “enamel shell” was build up using IPS Empress Direct Enamel in shade A2 and a palatal silicone key created from the mock-up. Dentin A3 was used for the dentin core and the mamelons. A natural looking result was achieved due to the translucent incisal effect created between the mamelons with the help of IPS Empress Direct Trans Opal. After that, the build-up was covered with a layer of IPS Empress Direct Enamel A2. The morphological structures were contoured and accentuated using fine diamond grinders, Arkansas stones, green grinders and polishing discs. Silicone polishers and diamond paste were used for polishing.

The outcome was a harmonious appearance of the anterior maxillary front in terms of shape, shade and size (Figs 11a and b).

### Discussion

Although the presence of the papilla may not be the key issue following single implant treatment,<sup>8-10</sup> preserving the papilla between two implants remains a challenge. The decision in this case was to extract the two teeth in stages and use temporary restorations to preserve the papilla. In addition, connective tissue grafts carried out at various points in time ensured ideal soft tissue contours. Although only a few references regarding the stability of connective tissue grafts can be found in the literature, recent studies have shown promising results.<sup>11</sup>

Since the aim is to establish a harmonious balance between the teeth and ensure appropriate white esthetics, preoperative

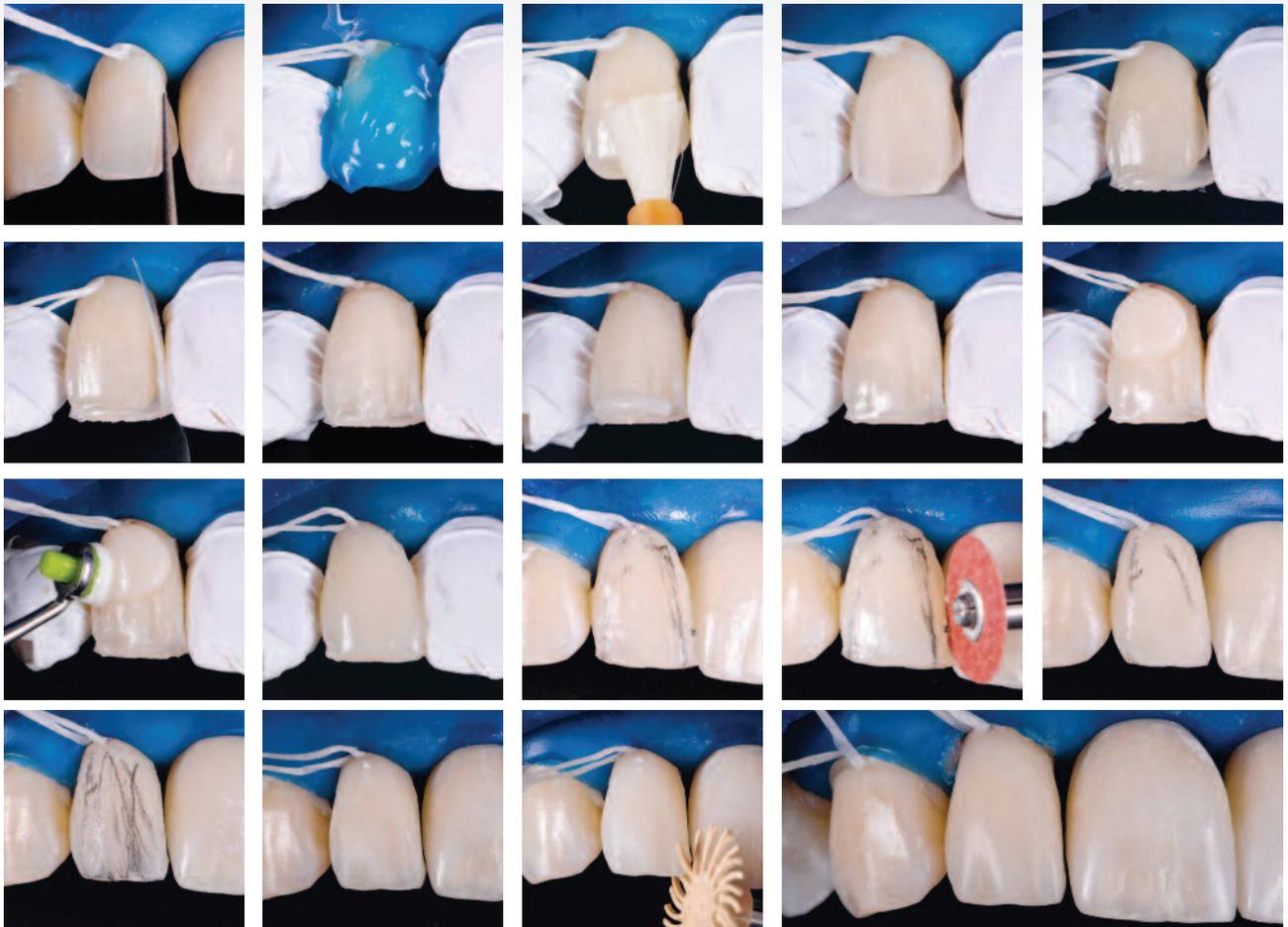


Figure 10: Individual stages in the intraoral fabrication of the composite build-14 ups on the lateral incisors.



Figure 11a and b: Result: Shade, shape and size of the anterior teeth create a harmonious appearance.

planning and a detailed case analysis are advisable.<sup>12</sup>

It is important to think carefully about which materials to use. In contrast to zirconium oxide and titanium, monolithic lithium disilicate restorations do not stimulate a subgingival attachment to the soft tissue.<sup>13</sup> Therefore, a hybrid abutment consisting of zirconium oxide or titanium could present an alternative.

### Conclusion

A multidisciplinary team approach is mandatory to achieve a predictable treatment outcome. Besides that, a detailed analysis and preoperative planning procedure play a crucial

part. Here, photo- and video-based evaluations present powerful instruments.

*All prosthetic procedures were conducted by Sofie Velghe, a prosthodontist, and all restorations were fabricated by Stephan van der Made, a dental technician.*

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*Literature available from the editors on request*

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