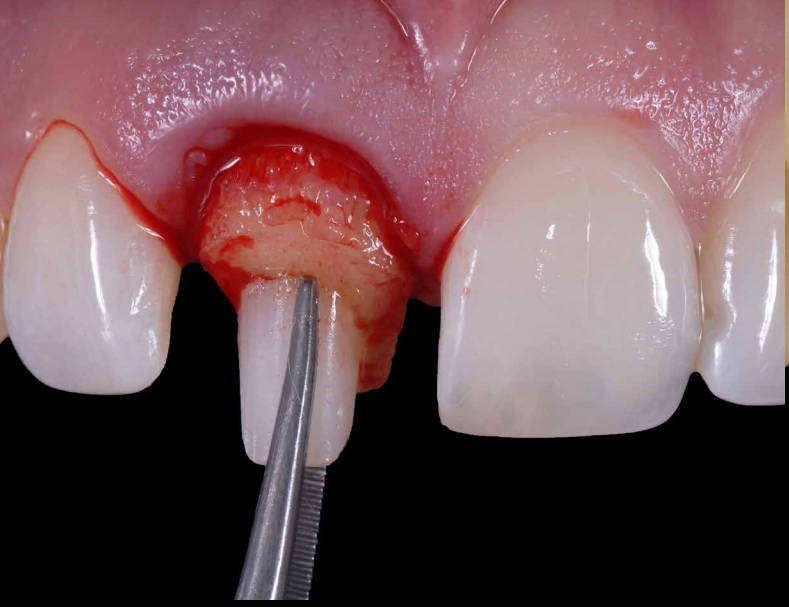


Analog Protocol for Obtaining the Ideal Soft Tissue Support and Contour in Anterior Implant Restorations

Eric Van Dooren, DDS[1]
Cristiano Soares, CDT[2]
Leonardo Bocabella, CDT[2]
Willy Clavijo, CDT[3]
Victor Clavijo, DDS, MS, PhD[4]

[1]**Please provide author affiliation.**

[2]Dental Technician, Campinas, Brazil.

[3]Dental Technician, Curitaba, Brazil.

[4]Professor, Advanced Program in Implantology and Restorative Dentistry, ImplantePerio Institute, São Paulo, Brazil. Visiting Scholar, Advanced Program in Operative Dentistry, Division of Restorative Sciences, Herman Ostrow School of Dentistry of USC, Los Angeles, California, USA.

Correspondence to: [Au: Please provide.]

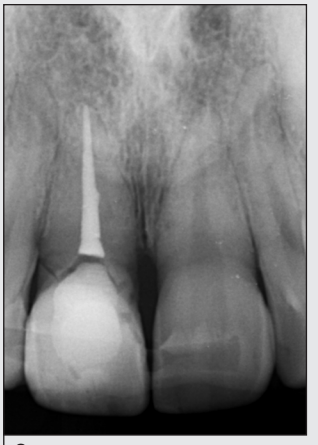
The restoration of a single anterior tooth with an implant-supported prosthesis can be an esthetic challenge. The final results are influenced by three main parameters: bone level and thickness, soft tissue contour and stability, and the clinical crown appearance.

Many articles describe different techniques for developing the ideal emergence profile of the implant restoration, mainly defining the ideal soft tissue contour by the provisional restoration. Still it is sometimes difficult to quantify and determine the ideal soft tissue support and emergence profile in some cases.

This case presentation demonstrates a technique that will allow the clinician and the dental technician to determine the ideal soft tissue support for challenging anterior implant restorations. It describes step by step the analog treatment modalities for copying the ideal, natural root form.

CASE PRESENTATION

1



2a

2b

3

Fig 1 Initial intraoral view.

Figs 2a and 2b Maxillary central incisor radiographs.

Fig 3 CBCT scan confirming the presence of the buccal bone walls. Note the loss of interdental bone on the distal aspect of the right central incisor. This will influence the final result and height of the distal papilla.

CASE PRESENTATION

Diagnosis and Treatment Planning

A 32-year-old woman presented with a fractured right central incisor (Fig 1). The tooth was splinted with a composite retainer to the adjacent teeth. Radiographic evaluation showed a satisfactory endodontic treatment (Fig 2). Probing depth did not exceed 4 mm in any of the examined areas. Moderate gingival inflammation was present, especially on the distal aspect of the tooth. A cone beam computed tomography (CBCT) scan confirmed light bone loss on the buccal aspect and adequate apical bone availability (Fig 3).

Implant Surgery and Copying the Transgingival Form of the Natural Root

Before extraction, the broken part of the tooth was removed and a composite and post were fabricated. A tooth preparation was made (Fig 4) and a silicone impression was taken (Permadyne, Impregum). This would allow accurate repositioning of the tooth in the impression after extraction (Figs 5 to 7).

The extracted tooth will be used to determine the transgingival contour for the provisional crown/abutment as well as for the final crown. Since the natural root dimensions will be copied, the soft tissue support and design should be ideal (Figs 8 to 11).

4a

4b

Figs 4a and 4b Initial preparation before extraction.

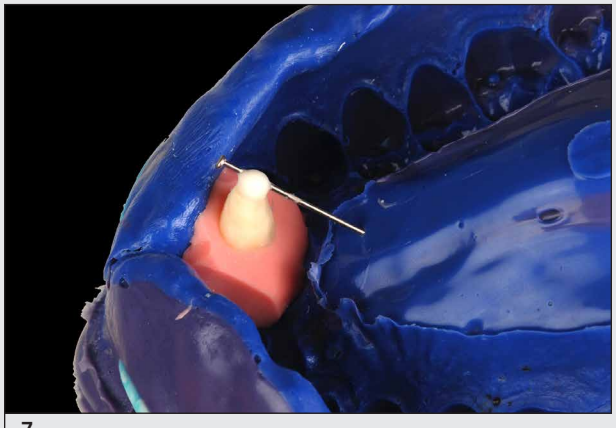
5

Fig 5 Atraumatic extraction.

6a

6b

Figs 6a and 6b Extracted right central incisor.



7

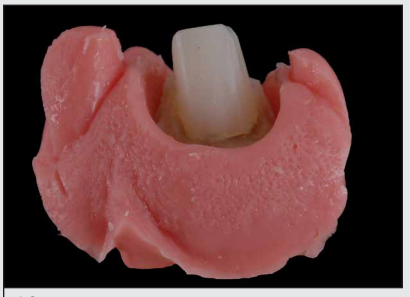
Fig 7 After repositioning the tooth in the impression, a soft tissue mask (Gingifast Rigid, Zhermack) will be injected around the tooth in order to have an exact copy of the root contour in the model.

8

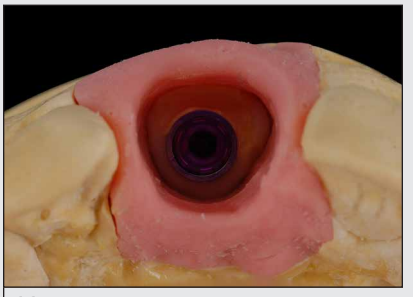
9

Fig 8 Model with extracted tooth in position.

Fig 9 The tooth can easily be removed from the model.



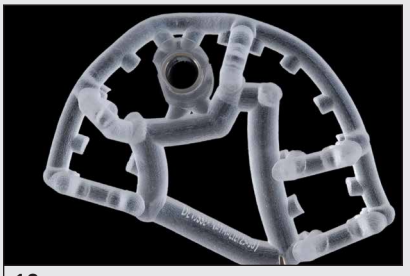
10



11

Fig 10 Close-up view of soft tissue and extacted tooth. When repositioning the root in the initial impression, all important gingival landmarks and original soft tissue contour will be maintained.

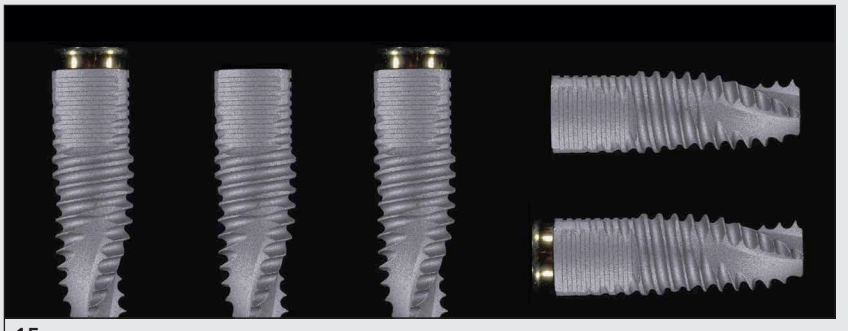
Fig 11 Model without the extracted tooth. Note the opening on the apical aspect, which will allow the implant replica to be connected without damaging the model.



12

13

14



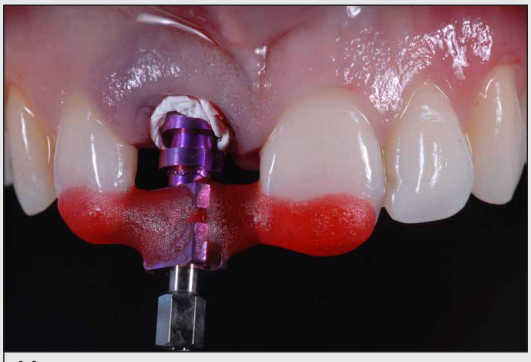
15

Fig 12 M-Guide surgical guide. The design and very precise positioning of this surgical guide allow the clinician to have visual control of the surgical field.

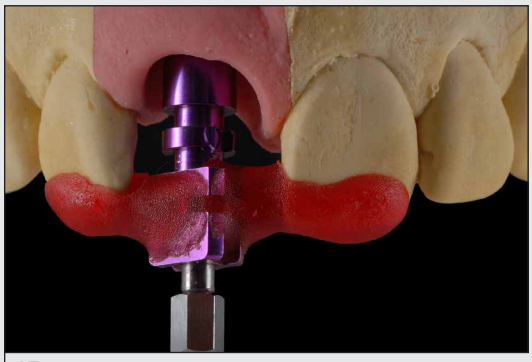
Fig 13 M-Guide in place. Using a surgical guide allows the clinician to place the implant exactly as planned.

Fig 14 Placement of a V Concept implant (MIS Implants). Note the triangular coronal design of the implant. The platform of the implant was placed 3 mm below the future gingival margin of the crown.

Fig 15 The V Concept implant system (MIS Implants).



16



17

Fig 16 Implant position transfer.

Fig 17 Duralay pick-up stent repositioned on the model.

Fig 18 When removing the soft tissue mask and after connecting the replica to the implant impression coping, the original triangular socket contour is clearly visible.

18

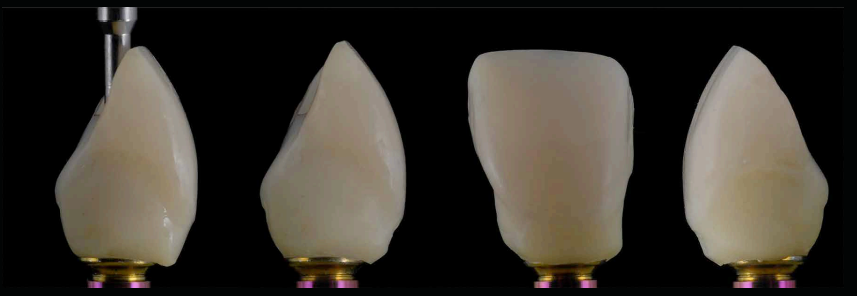
From this point on, all prosthetic components—provisional to final crown—will have the transmucosal design identical to the form that is determined by the natural root. This should provide the most biologic support and design.

While the model was refined in the lab, the extraction socket was carefully curetted and the integrity of the buccal walls was confirmed. Meanwhile, a V3 implant (3.9 × 13 mm, MIS Implants) was placed using a 3D printed surgical guide (M-Guide, MIS Implants) (Figs 12 to 14). The V Concept implant allows the clinician to choose between a bone-level implant and a transmucosal implant design, according to the clinical situation (Fig 15). Both designs allow for platform shifting and come with concave transmucosal prosthetic components for improving connective tissue thickness and stability.

Ideal initial stability was achieved (45 Ncm), allowing for immediate provisionalization. The triangular coronal design of the implant allows for more bone where it matters most, in all clinical indications. Subsequently it also allows for more vascularity for both bone and soft tissue around the implant.

After implant placement, a Duralay transfer with a support on the adjacent teeth was fabricated. The implant impression coping was secured to the stent intraorally (Figs 16 and 17). This technique of transferring the natural root with its appropriate and ideal gingival support will allow the clinician to use this analog information from this point on in all clinical steps: provisionalization, final impression, final abutment fabrication, and final crown delivery. Since the provisional crown will support the soft tissue in the critical and subcritical zone identically to what the natural root provided to the soft tissue, very small volumetric changes are expected (Fig 18).

After taking the implant-level impression and initiating the fabrication of the provisional crown in the lab (Figs 19 and 20), the gap between the implant and the socket wall was filled with anorganic bovine bone matrix (Bio-Oss, Geistlich) to compensate for the loss of volume that occurs after tooth extraction (Fig 21). A subepithelial connective tissue graft was placed and stabilized by a single suture (Figs 22 to 24). In this case there was no need to fabricate or connect the provisional crown intraorally.

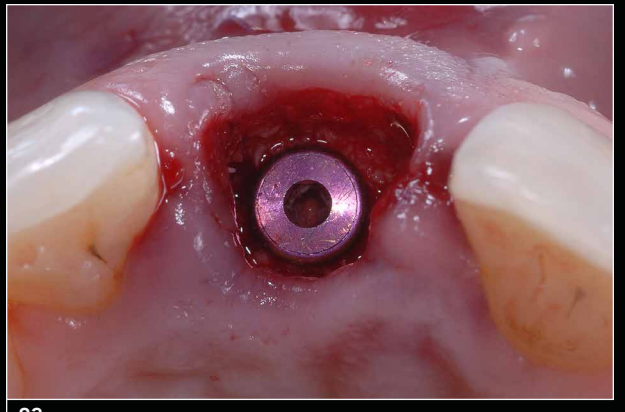


19

20

21

22



23

24

Fig 19 Relining and connecting the provisional crown with flowable composite to the titanium provisional cylinder and the gingival mask. Copying the original natural root contours gives the clinician the ability to optimize the soft tissue support.

Fig 20 Provisional crown on the model. Care is taken to copy the line angle position and form using the natural contralateral tooth as a reference.

Fig 21 Anorganic bovine bone matrix will be placed between the implant and the existing buccal socket wall.

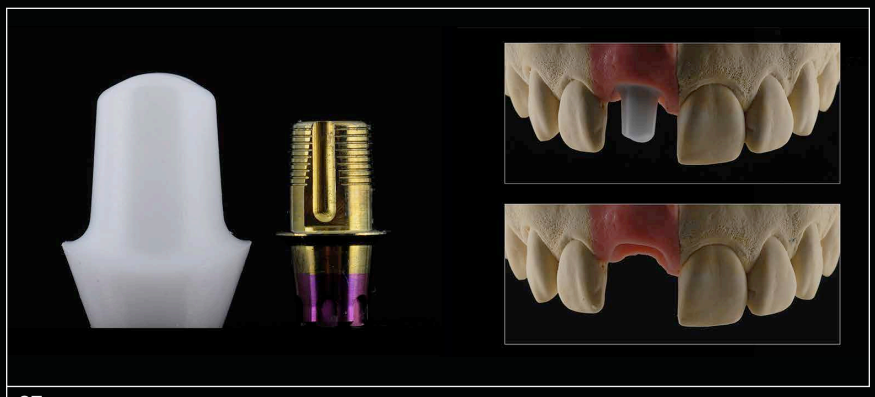
Fig 22 Subepithelial connective graft with 2 mm of thickness is stabilized in the buccal split thickness envelope.

Fig 23 Occlusal image clearly shows the different layers and the palatal implant position.

Fig 24 Provisional crown in place, and connective tissue graft secured with a single suture.

25

26



27

Fig 25 Occlusal view after 3 months.

Fig 26 Customized impression post for taking the final impression.

Fig 27 Prefabricated ziconia abutment (MIS Implants) and Ti-Base with 1.5 mm gingival height. Note the yellow/golden color and of all V Concept components. This color has a positive influence on tissue color (warmer color). Also note the concave transmucosal form of the Ti-Base.

Final Impression, Laboratory Phase, and Restoration Cementation

The provisional crown was retrieved after 3 months (Fig 25). The gingival contours and gingival health were ideal. Small particles of anorganic material were still visible in the transgingival area but were easily removed.

The final impression was taken using a customized impression post (Fig 26). The most precise way of transferring the provisional subgingival contour and preventing tissue collapse contours was to reline the implant impression coping on the initial soft tissue model. This should allow the original design and root form to be copied and therefor have at this final prosthetic stage the ideal and biologic abutment geometry without any extra prosthetic and surgical manipulation.

A prefabricated ziconia abutment (MIS Implants) and Ti-Base with 1.5 mm gingival height were selected (Fig 27). The abutment was ceramized with Noritake CZR porcelain, following the gingival model design and allowing for precise adaptation to the preformed transgingival design and contour (Figs 28 to 30). For the final restoration, lithium disilicate (Emax, Ivoclar) was chosen (Figs 31 to 34).

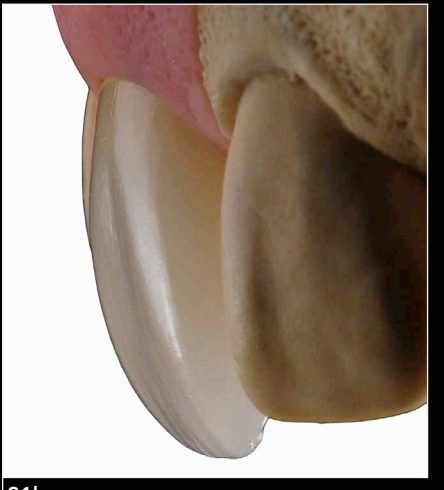
Fig 28 Zirconia abutment ceramized with Noritake CZR porcelain. Note the excellent fit of all components.

Fig 29 Use of fluorescent materials in the critical zone can work to mimic nature for a natural-looking restoration.

30a

30b

31a



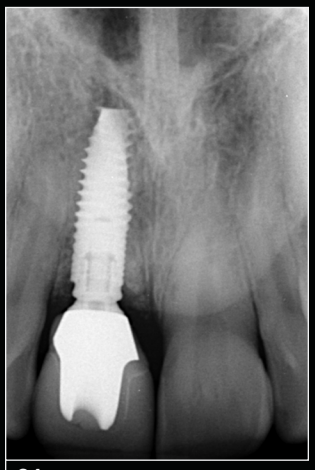
31b

32

33a

33b

33c



34

Figs 30a and 30b Try-in of the hybrid abutment. Note the color and soft tissue integration of the abutment. Since the transgingival contour is an exact copy of the natural root contour, there is no blanching of the gingiva and no tendency for apical migration or recession.

Figs 31a and 31b Care is taken to position the mesial and distal line angle according to the line angle position of contralateral central incisor.

Fig 32 Comparison of the final crown with the abutment form and natural root form.

Figs 33a to 33c Final restoration in situ. Note the excellent gingival adaptation.

Fig 34 Final radiograph shows adequate bone level and the precision in the fabrication and cementation of the different components.

CONCLUSION

The clinical outcome of anterior implant restorations is directly associated with the soft tissue management during surgery, but also with the immediate prosthetic recording of the natural gingival contour. In this case, the natural root form was used to establish the ideal gingival parameters of the implant restoration.

BIBLIOGRAPHY

Chen ST, Buser D. Esthetic outcomes following immediate and early implant placement in the anterior maxilla—A systematic review. Int J Oral Maxillofac Implants 2014;29(suppl):186–215.

Cosyn J, Eghbali A, De Bruyn H, Collys K, Cleymaet R, De Rouck T. Immediate single-tooth implants in the anterior maxilla: 3-year results of a case series on hard and soft tissue response and aesthetics. J Clin Periodontol 2011;38:746–753.

Fürhauser R, Florescu D, Benesch T, Haas R, Mailath G, Watzek G. Evaluation of soft tissue around single-tooth implant crowns: The pink esthetic score. Clin Oral Implants Res 2005;16:639–644.

Gonzalez-Martın O, Oteo C, Ortega R, Alandez J, Sanz M, Veltri M. Evaluation of peri-implant buccal bone by computed tomography: an experimental study. Clin Oral Implants Res 2015 Jul 14. doi: 10.1111/clr.12663 [E pub ahead of print].

Grunder U. Crestal ridge width changes when placing implants at the time of tooth extraction with and without soft tissue augmentation after a healing period of 6 months: Report of 24 consecutive cases. Int J Periodontics Restorative Dent 2011;31:9–17.

Nozawa T, Yamaguchi S, Ookame Y, Shimada K. The distances between the facial and palatal papillae in the maxillary anterior dentition. Eur J Esthet Dent 2011;6:88–93.

Prestipino V, Passero P, Ingber A, Wyman B. Preserving the topography of the extraction site: The external gingival support splint. J Esthet Dent 1994;6:259–266.