

A technique to convert a three-dimensionally printed cast used in the fabrication of an interim implant-supported crown into a definitive cast capturing the acquired emergence profile

Abstract

An esthetic peri-implant soft tissue contour is a critical element of the success of implant restorations in the esthetic zone. Once the optimal transmucosal soft tissue profile is formed, it needs to be accurately replicated on the master cast. This clinical technique involves the utilization of a silicone putty positioning index placed in the patient's mouth to accurately duplicate the external contour of teeth and soft tissue. By combining this positioning index with the implant-supported interim crown, the 3D-printed initial cast, which was used to fabricate the interim crown, can be conveniently and efficiently transformed into a definitive master cast.

Key words: Emergence profile; impression, peri-implant; cast

Restoring missing teeth in the anterior esthetic zone with an implant-supported prosthesis has become a popular treatment option, but it also presents challenges in achieving an esthetic emergence profile. In addition to ensuring optimal three-dimensional placement of implants, the esthetic success of anterior implant prosthesis depends on the use of an interim implant-supported prosthesis to create a harmonious gingival architecture around the implants.^{1, 2} Once the desired soft tissue profile has been achieved, accurate transferring of the soft tissue information from patient's mouth to the definitive cast becomes a critical step. Dental laboratory technicians rely on this information to replicate the created emergence profile and fabricate the definitive prosthesis.

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/jopr.13760](https://doi.org/10.1111/jopr.13760).

This article is protected by copyright. All rights reserved.

Within six to twelve weeks, a harmonious gingival architecture could be developed with the assistance of interim implant prostheses.³⁻⁵ However, the peri-implant soft tissues quickly collapse after the removal of the interim prosthesis. Therefore, special impression-making techniques are required to overcome this challenge and to accurately transfer the emergence profile to the definitive cast. Several techniques were reported to customize the impression coping with either direct or indirect approaches. In a direct custom impression coping technique, the peri-implant soft tissues are reproduced by flowable composite;⁶ Alternatively, the interim restoration itself is used as a customized impression coping to make the final impression.⁷ In indirect custom impression coping techniques, an analog holder or the initial cast used to fabricate interim prostheses, is employed to replicate the emergence profile of interim restoration.⁸⁻¹⁰ More recently, digital approaches have been proposed to record the emergence profile.¹¹⁻¹⁵

In this article, we describe a new approach to convert the initial cast used in the fabrication of an implant-supported interim crown to a definitive cast that accurately duplicates the peri-implant soft tissue contour. This technique offers an alternative method for transferring the emergence profile and soft tissue contour around implant restoration, providing an efficient and convenient way to convert the initial cast into the definitive master cast. Compared to other reported techniques, a unique feature of this technique is the omission of making a new impression and cast. One limitation of this technique is the requirement to preserve the initial cast following the fabrication of the interim crown.

Technique

1. Make a digital impression using an intraoral scanner (TRIOS 3; 3Shape, Denmark) and scan body (IO 2B-B SA; Nobel Biocare, Switzerland) to capture and record the position of an

implant (NobelActive RP 4.3 x 10 mm; Nobel Biocare) for the restoration of a missing maxillary left central incisor (Fig 1a).

2. Fabricate an interim implant-supported crown using the 3D-printed initial cast (Fig 1b).
3. Once the desired esthetic result has been achieved using the interim implant-supported crown (Fig 2a), use silicon putty impression material (Aquasil; Dentsply Sirona, USA) to create an index to capture the morphology of the interim implant-supported crown and its associated gingival tissue (Fig 2b, 2c). Apply petroleum jelly to the tissue surface of silicon putty index as separating agent.
4. Trim the coronal peri-implant portion of the initial cast to accommodate the impression material (Fig 3a-b), and remove the interim implant-supported crown from the patient's mouth, and place it back onto the relieved initial cast (Fig 3c). It is important to note that the coronal peri-implant portion of the initial cast is slightly over-trimmed to create a spillway for the low-viscosity pink silicon impression material used in Step 5.
5. Inject a generous amount of low-viscosity pink silicon impression material (Gingifast; Zhermack, Italy) to fill the space around the interim implant-supported crown (Fig 3d), and firmly seat the silicon putty index onto the initial cast (Fig 3e).
6. Once the pink silicon impression material is set, remove the putty index (Fig 3F), and subsequently, remove the interim implant-supported crown to obtain a definitive cast that captures both the internal and external morphology of the peri-implant soft tissue created by the interim implant-supported crown (Fig 3g).
7. Fabricate a permanent implant-supported crown using the definitive cast and then insert it in the patient's mouth (Fig 3h).

Summary

This presented clinical technique accurately reproduces the peri-implant soft tissue contour and emergence profile around the interim implant-supported crown. It offers a simplified and efficient approach to creating a definitive cast using the initial cast.

References

- 1 Chee WW: Provisional restorations in soft tissue management around dental implants. *Periodontol 2000*. 2001; **27**: 139-147.
- 2 Wittneben JG, Buser D, Belser UC, et al.: Peri-implant soft tissue conditioning with provisional restorations in the esthetic zone: the dynamic compression technique. *Int J Periodontics Restorative Dent*. 2013; **33**: 447-455.
- 3 Schoenbaum TR, Kim YK, Khalifa F: Emergence Contours for Single-Unit Implant Provisionals in the Esthetic Zone. *Compend Contin Educ Dent*. 2021; **42**: 374-380.
- 4 Alshiddi IF, Dent DC: Accurate registration of peri-implant soft tissues to create an optimal emergence profile. *Contemp Clin Dent*. 2015; **6**: S122-125.
- 5 Zhuang J, Wang Y, Song Y, et al.: The application of individualized abutment-crown integrated provisional restoration in optimizing the peri-implant soft tissue contour in the esthetic zone. *J Esthet Restor Dent*. 2021; **33**: 560-566.
- 6 Polack MA: Simple method of fabricating an impression coping to reproduce peri-implant gingiva on the master cast. *J Prosthet Dent*. 2002; **88**: 221-223.
- 7 Attard N, Barzilay I: A modified impression technique for accurate registration of peri-implant soft tissues. *J Can Dent Assoc*. 2003; **69**: 80-83.
- 8 Hsieh YL, Aronovich S, Munz S, et al.: A Technique to Simultaneously Fabricate Multiple Custom Impression Posts for Implant-Supported Restorations in the Esthetic Zone. *J Prosthodont*. 2019; **28**: 339-342.

- 9 Patras M, Martin W: Simplified custom impression post for implant-supported restorations. *J Prosthet Dent.* 2016; **115**: 556-559.
- 10 Paranhos KS, Oliveira R: An impression technique to accurately transfer soft tissue contours for implant-supported restorations: three case reports. *J Oral Implantol.* 2001; **27**: 317-321.
- 11 Dhingra A, Taylor T, Flinton R: Digital Custom Impression Technique to Record Emergence Profile and Fabrication of an Esthetic Implant Supported Restoration. *J Prosthodont.* 2020; **29**: 636-639.
- 12 Joda T, Wittneben JG, Bragger U: Digital implant impressions with the "Individualized Scanbody Technique" for emergence profile support. *Clin Oral Implants Res.* 2014; **25**: 395-397.
- 13 Monaco C, Evangelisti E, Scotti R, et al.: A fully digital approach to replicate peri-implant soft tissue contours and emergence profile in the esthetic zone. *Clin Oral Implants Res.* 2016; **27**: 1511-1514.
- 14 Monaco C, Scheda L, Baldissara P, et al.: Implant Digital Impression in the Esthetic Area. *J Prosthodont.* 2019; **28**: 536-540.
- 15 Zimmermann D, Ferreira de Almeida DC, Velloso G, et al.: Digital replication of the peri-implant soft tissue contour of implant-supported crowns: A dental technique. *J Prosthet Dent.* 2022; **128**: 8-12.

Figure Captions

Figure 1. Fabrication of interim implant-supported crown. (a) Digital scan with scan body. (b) Interim implant-supported crown on the 3D-printed cast.

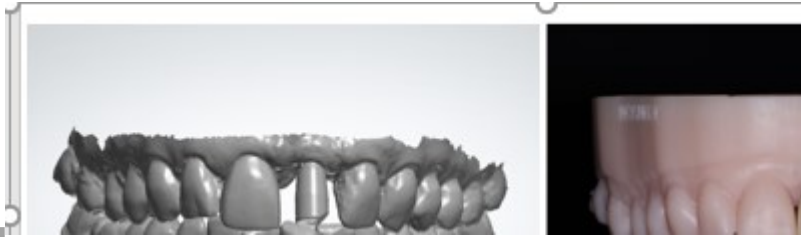


Figure 2. Fabrication of silicone putty positioning index. (a) Clinical appearance of interim implant-supported crown replacing missing left central incisor. (b) Silicone putty is used to register the external morphology of crown and peri-implant tissue. (c) Silicone putty positioning index is removed from the mouth and trimmed.



Figure 3. Replicating the external and internal morphology of peri-implant tissue. (a) The 3D-printed cast used in the fabrication of the interim crown. (b) The gingival portion of the peri-implant area is trimmed in the 3D-printed cast. (c) Interim implant-supported crown is seated in the trimmed cast. (d) Pink silicon is injected in the peri-implant area. (e) The silicon putty positioning index is seated on the cast. (f) After the removal of silicon putty positioning index. (g), Definitive implant cast with customized emergence profile. (h) Clinical appearance of the definitive implant-supported crown.

