Short Communication

Digital implant impressions with the “Individualized Scanbody Technique” for emergence profile support

Authors’ affiliations:
Tim Joda, Division of Fixed Prosthodontics, School of Dental Medicine, University of Bern, Bern, Switzerland
Department of Prosthetic Dentistry, Center for Dental and Oral Medicine, University Hospital Hamburg-Eppendorf, Hamburg, Germany
Julia-Gabriela Wittneben, Urs Brägger, Division of Fixed Prosthodontics, School of Dental Medicine, University of Bern, Bern, Switzerland

Corresponding author:
Dr. Tim Joda, DMD, MSc
Division of Fixed Prosthodontics
School of Dental Medicine
University of Bern
Freiburgstr. 7, Bern 3010, Switzerland
Tel.: +41 (0)31 / 632-0910
Fax: +41 (0)31 / 632-4931
e-mail: tim.joda@zmk.unibe.ch

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Abstract

Objective: The Short Communication presents a clinical case in which a novel procedure – the “Individualized Scanbody Technique” (IST) – was applied, starting with an intraoral digital impression and using CAD/CAM process for fabrication of ceramic reconstructions in bone level implants.

Material and methods: A standardized scanbody was individually modified in accordance with the created emergence profile of the provisional implant-supported restoration. Due to the specific adaptation of the scanbody, the conditioned supra-implant soft tissue complex was stabilized for the intraoral optical scan process. Then, the implant platform position and the supra-implant mucosa outline were transferred into the three-dimensional data set with a digital impression system. Within the technical workflow, the ZrO$_2$-implant-abutment substructure could be designed virtually with predictable margins of the supra-implant mucosa.

Results: After finalization of the 1-piece screw-retained full ceramic implant crown, the restoration demonstrated an appealing treatment outcome with harmonious soft tissue architecture.

Conclusions: The IST facilitates a simple and fast approach for a supra-implant mucosal outline transfer in the digital workflow. Moreover, the IST closes the interfaces in the full digital pathway.

Materials and methods

A clinical case, requiring a single-implant restoration for the replacement of tooth 22, was chosen to present step-by-step the “Individualized Scanbody Technique” (IST) for digital impressions of bone level implants and further fabrication of a CAD/CAM ZrO$_2$-substructure restoration.

To transfer the finalized supra-implant soft tissue structure, which was achieved by conditioning with an implant-supported provisional crown [Neale & Chee 1994], an intraoral optical scan was planned to be taken with a digital impression system (iTero Scanner, Align Technology Inc., San Jose, CA, USA) [Fig. 1].

A standardized scanbody (Straumann AG, Basel, Switzerland) was individualized in accordance with the emergence profile of the provisional implant crown. The modified scanbody was used to digitally transfer the implant platform position while preventing the collapse of the sensitive supra-implant emergence profile. Hereby, the IST symbolized a further development of the individualization...
The “Individualized Scanbody Technique” (IST)

Methods of prefabricated implant transfer posts as known from conventional impression-taking procedures (Buskin & Salinas 1998, Elian et al. 2007) [Fig. 2].

The intraoral optical scan was taken with the screw-retained individualized scanbody. The supra-implant soft tissue complex was supported ideally during the intraoral scan. The outline of the conditioned mucosal margin could be detected easily within the CAD software program. Then, a customized ZrO₂-implant-abutment substructure was planned virtually (CARES Digital Solutions, Straumann AG, Basel, Switzerland) [Fig. 3].

The electronic data of the designed substructure were sent to a milling center for the following CAD/CAM manufacturing process. Then, the customized ZrO₂-abutment was completed with veneering material as a 1-piece screw-retained implant crown for the rehabilitation of the missing tooth 22. Finally, a clinical evaluation was performed including the Pink Esthetic Score (PES) [Furhauser et al. 2005] [Fig. 4].

Results

The implant-supported single-unit restoration for the rehabilitation of tooth 22 demonstrated a clinically pleasant and harmonious treatment outcome. The evaluation of the soft tissue revealed no discrepancies for the mesial and distal papilla, a symmetric curvature and level of the facial mucosa compared with the natural corresponding tooth 12 and only minor differences to the root convexity. Overall, the treatment result of the Pink Esthetic Score (PES) was 9 of 10 [Furhauser et al. 2005].

Discussion

The successful rehabilitation with implant-supported fixed restorations in the esthetic zone remains one of the biggest challenges in implant dentistry (Chee 2003, Belser et al. 2009). One of the advantages of the bone level implant system is that the prosthodontist has the freedom to individually design an emergence profile to mimic the contralateral natural tooth (Priest 2005). Furthermore, the digital workflow allows the manufacturing of customized abutments with ideal soft tissue maintenance in combination with high-performance restoration materials (Patel 2010). But the use of standardized bone level implant scanbodies with a circular diameter characterizes a discrepancy to the individually shaped emergence profile and leads to a collapse of the fragile supra-implant mucosa and, consequently, to a computer-generated misinterpretation of the soft tissue outline. The result would be an under-contoured implant-supported crown with an inadequate soft tissue support and a compromised treatment outcome.

Therefore, the modification of implant scanbodies with an individualized shape, as a contour copy of the provisional crown, seems to be a prerequisite in the field of digital impression technique. Overall, the introduced IST reveals a simple and fast approach with an ideally supported soft tissue complex during the intraoral scan procedure. By the application of this technique, the mucosa outline can be transferred predictably into the process chain of the digital workflow. There is no need for uncertain assumption of the individually created soft tissue margins in the technical fabrication. However, the shape of the entire submucosal part of the collar cannot be captured at this time. Future developments are required for a more precise scanning process of the bottom and the inner surface of the supra-implant emergence profile.

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References


