3D-printed surgical guide for implantology and 3D-printed temporary restoration

Case Description

A 58-year-old male patient presented himself to my practice with a missing tooth #30 to restore the natural chewing function while preserving healthy tooth structure. The gap was to be restored with an implant and a ceramic crown (Cercon HT + XT). For the highest possible predictability of the clinical outcome and safety during implementation, I planned and implemented the treatment digitally (Backward Planning).

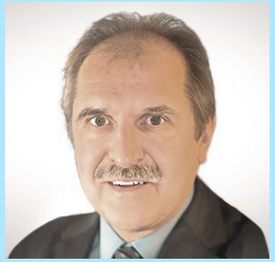
We started with a low-dose DVT of the right mandible that had a radiation exposure of about 6 µSv (30% of an OPG). It was created for this purpose using the Orthophos SL 3D. We also took digital impressions of both jaws with the Primescan AC. After selecting the “Implant planning” workflow in the CEREC software, we calculated a functionally adapted virtual crown. The treatment planning itself was carried out in the SICAT Implant 2.0 software (SICAT, Bonn). Firstly, the scan data and the virtual restoration from the CEREC software were overlaid with the DVT and the course of the alveolar nerve was visualized. Based on this diagnostic information, it was possible to correctly plan the implant prosthetically, considering the anatomical structures. The surgical guide required for guided implant placement was designed in accordance with the planning in CEREC SW 5.2. The design was completed in about three minutes with the transfer to the inLab 22 CAM software.

The preparing of the production via 3D printing with Primeprint was fully automated and was done in a few clicks. The guide was created with Primeprint Guide material in the Primeprint Solution, the 3D-printer and the Post Processing Unit (PPU). After printing, the object was manually transferred with the Primeprint Box from the 3D-printer to the PPU, where it received its final properties through post-processing (washing, drying, curing). In total, the process took about 80 minutes.

The implant was guided through the template and inserted with minimal invasiveness, without complications and as planned. Before wound closure, the implant position was digitally captured using Primescan AC so that the definitive denture, which had been fabricated in the meantime, could be placed during re-entry, three months later, in accordance with the Munich implant concept.

Discussion

I have had an excellent experience with digital implant planning for over ten years, especially due to the precise implementation with a surgical guide. Guides produced by 3D printing have a very high accuracy of fit, are cost-effective and can be sterilized. Patients are very impressed with the digital technology and smooth processes. They feel well taken care of and have no post-operative complaints.



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Velbert, Germany

Before: Initial oral situation

Usage: 3D-printed surgical guide with Primeprint Guide material

After: 3D-printed temporary restoration with Primeprint Temp material (left) and final restoration (right)

Case Description in Pictures

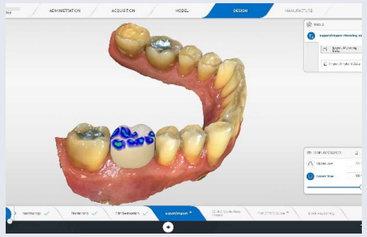

Fig 1: Impression with Primescan, 3D model including prosthetic proposal for restoration of tooth #30 in CEREC SW 5.2.

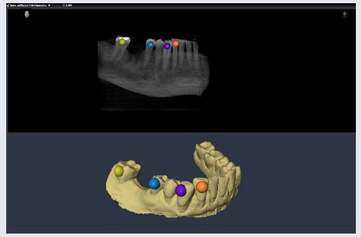

Fig. 2: Matching of model data and CBCT in the SICAT SW

Fig. 3: Treatment planning including selection of the implant

Fig. 4: Design of the surgical guide in CEREC SW 5.2

Fig 5: Printed surgical guide with inspection window

Fig 6: Accurate fit of the surgical guide on the teeth for stabilization

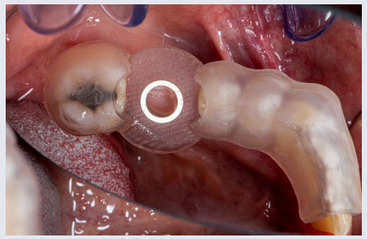

Fig. 7: Mirror image of the occlusal view of the surgical guide

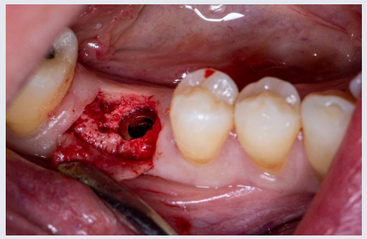

Fig. 8: Accurate drilling and implantation by using the printed surgical guide in the inLab CAM SW 22

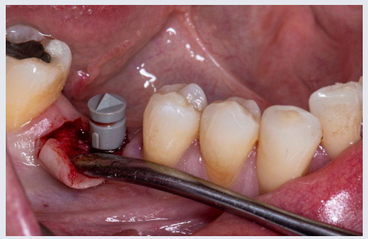

Fig 9: Intraoperative digital impression of the implant

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Fig 10: Design of the final restoration in the inLab SW 22

Fig. 11: Abutment made of Cercon ht ML und crown made of Cercon xt ML

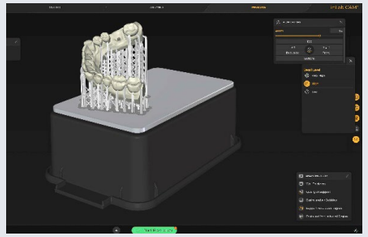

Fig 12: Preparation of printing the model with Primeprint Solution in inLab CAM 22

Fig 13: Final crown after bonding of abutment and TiBase on printed model

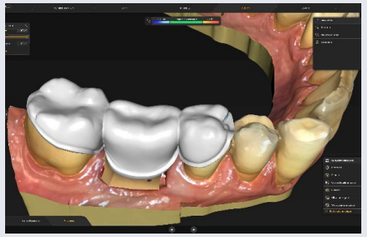

Fig 14: Design of the insertion tool for the abutment

Fig 15: Preparation of the print job of the insertion tool and a temporary crown (copy of the final crown from Fig. 13) in inLab CAM 22

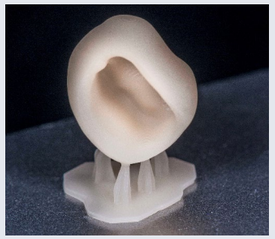

Fig 16: Temporary crown after 3D printing and post-processing for implant uncovery restoration

Fig 17: Insertion of the abutment during uncovery

Fig. 18: Restoration with 3D-printed temporary crown until the soft tissue heals

Fig. 19: Situation after incorporating the final restoration

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