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Dental Implant CASE REPORT

All-on-Four™ 4 Peek-Composite Restoration Using the Simple Guide Concept: A Case Report



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Figure 1a-c. a) Clinical photograph of the patient's lower arch, b) Open Sleeve guided surgery in use with DENTIS™ Simple Guide Kit®, c) Final restoration

Case History

The 64-year old male patient presented in this case had fully edentulous arches. He complained of a loose mandibular denture despite it having been recently made. Upon examination, he was found to have an atrophied lower jaw with insufficient ridge height (Figure 1a). The patient required a fixed lower denture. CBCT examination showed bilateral low ridge height in the posterior

part of the mandible. The patient had planned to receive a two stage screw-retained fixed prosthesis retained by four implants following the standard All-on-Four™ protocol. Due to the long crown height space, the PEEK-Composite structure was planned to provide a passive light weight framework with aesthetic pink composite cervical restoration (FP3).



Methods

The patient's denture was examined for proper stability and occlusion. The denture was duplicated into a radiopaque scan appliance (with a 4:1 ration of acrylic resin to barium sulphate). The scan was completed while the patient wore the scan appliance. Next, the scan appliance was optically scanned over the patient model and finally, the patient edentulous model was optically scanned, following triple scan protocol.

Four 3.7mm x 12mm implants (S-Clean® by DENTIS™ – Korea) were planned virtually. The two anterior implants were placed in the lateral incisor region while the posterior implants were planned to emerge cervically in the second premolar region, with their apices were directed mesially to avoid the inferior alveolar nerve (Figure 2,3,4).

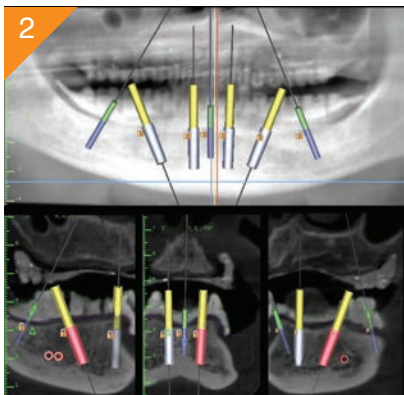


Figure 2. implant planning on CBCT sections.



Figure 3. 3D implant views in relation to the nerve.



Figure 4. 3D implant positions in relation to patient setup.

After adding three fixation screws, a virtual guide was designed and printed for use with the simple guide protocol (Figure 5).

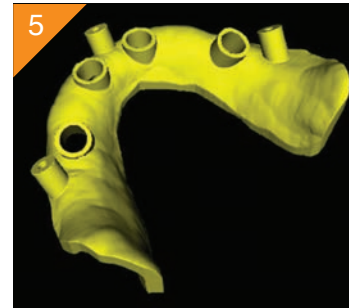


Figure 5. Virtually designed implant guide.

Flapless implant bed preparation and implant insertion was then performed. First, the guide was temporarily fixed with three anchor screws. The Simple Guide Kit® (DENTIS™ – Korea) was used to prepare the site. Once the guide was removed, free hand final drilling was completed and the implant was inserted using the DENTIS™ S-clean® implant kit (Figures 6-9).



Figure 6. Simple Guide Kit®.



Figure 7. Fixing the surgical guide intraorally with anchor screws.



Figure 8. Guided implant osteotomy for pilot and intermediate drilling.



Figure 9. Freehand implant insertion.

After 2 months, the multi-unit transmucosal abutments were attached to the implants following a localized crestal incision to preserve the limited keratinized mucosa. For the anterior implants, straight abutments were used while 17-degree abutments were utilized for the posterior implants. A splinted open-tray abutment-level impression was made for the four abutments placed. Impression accuracy was checked using the single screw test with a verification jig (Figure 10-12).



Figure 10. Second stage multi-unit abutments installation.

Figure 11. Open-tray splinted impression.

Figure 12. Verification jig for checking passivity.

Titanium cylinders were attached to the analogues on the model. Excess height was trimmed. The model was scanned for designing a wax framework that connected the four titanium cylinders. The milled wax was attached to the cylinder to form a single framework. The wax-titanium assembly was sprued and invested using PEEK pressing methods (For2 Press[®] by Bredent[™] - Germany). Ceramic-filled PEEK material (Bio HPP[®], Bredent[™]) was injected into the mold after wax elimination. The finished framework was checked for passivity and seating over the model. It was rescanned over the model to create CAD/CAM composite veneers that fit over the framework. The milled composite veneers (HIPC[®], Bredent[™]) were mounted to the frame with laboratory bonding composite (Combolign[®], Bredent[™]) along with a transparent silicone key. The reproduction of the cervical pink portion was performed using Crealign composite (Bredent[™], Figure 13-21). The polished framework was examined in the patient's mouth for passivity and occlusion. The prosthesis was then attached to the abutment

and the screws were torqued to 20Ncm. Access holes were sealed with composite restorative material (Figure 22.)

Discussion

The use of the All-on-Four[™] strategy is now considered a widely approved approach to restore the dentition of fully edentulous patients.^{1,2} The placement of implants is critical in regard to both the anatomical and prosthetic points of view. Computer guided planning and placement procedures effectively enhance the patient's safety during implant placement by improving the practitioner's ability to avoid unnecessary injury to the patient's inferior alveolar nerve or fenestration of the cortical plates. In this case, it also allowed for flapless implant installation that reduced surgical time and produced minimal postoperative pain.³ From the prosthetic perspective, it allowed the implant's inclination and setting to suit ideal prosthetic axis channels for the planned screw-retained restoration. Failure to achieve such inclination would have complicated the prosthetic procedures and compromised the final aesthetic outcome.

In this case report, ceramic-filled PEEK with composite veneers were used as a final restorative material to overcome the pitfalls of metal-ceramic, or all-zirconium screw-retained frames. The modulus of elasticity for PEEK is close to that of bone,

Series of Clinical Views



Figure 13. A scanned model after attaching titanium cylinders.

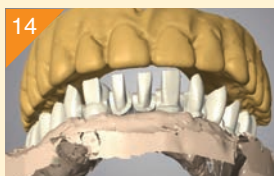


Figure 14. Designing a cut wax pattern for the prosthesis.

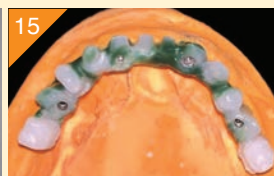


Figure 15. Attaching the milled wax to the titanium cylinders.



Figure 16. Preparing the wax-titanium framework for investing.



Figure 17. TPRESSED framework scanned for veneer design.



Figure 18. The virtual CAD of the composite veneers.



Figure 19. The CAD CAM composite veneers temporarily attached to PEEK frame with wax.



Figure 20. Fabricating the transparent silicone index.



Figure 21. Pink composite characterization after veneer placement.



Figure 22. Placing the final restoration intraorally.

allowing for shock absorption and better mechanical adaptation.⁴ The press-to technique aided in overcoming common casting errors encountered in large reconstruction cases that involve significant inter-arch distance. It also assures better security and long term connection between the titanium cylinders and the PEEK, instead of relying on a bonding cement.

Conclusion

The simplified guided implant placement combined with pressed PEEK restoration yields a predictable treatment modality for All-on-Four™ restorations.

References

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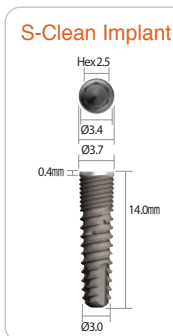
Products Used

Bredent

- BioHPP
- For2Press machine
- HIPC composite Blanks 98.5x14mm
- Comblign and Crealign veneering composites

Planning Software

- Bluesky Plan3 for implant planning
- Dental Wings software of implant prosthesis



DENTIS USA (La Palma, CA, USA)

- S-Clean® implant 3.7x14 (DSFM3714S)
- MU couple abutments(DSMCA4830HS) MU angled abutment 17-degree(DSMAA48740HS), MU transfers(DMTICS), MU lab analogues(DMLA) and temporary titanium cylinders(DMTCS)
- Simple Guide Kit®

MU Angled Abutment



MU Transfers



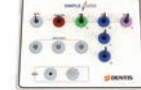
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