Full arch reconstruction of the edentulous maxilla

Using the CAMLOG Guide System Prosthetics

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Introduction on patient and treatment

The male patient, aged 59, was looking for a new fixed restoration for his maxilla. His case history showed no general disease. The patient had been fitted with telescopic model casting prostheses in the maxilla and mandible.

Due to the periodontally insufficient anterior residual teeth in the maxilla (teeth 11, 12, 21, 22), the prosthesis could no longer be supported. After losing the residual teeth, the patient wanted a fixed implant-based restoration of the maxilla.

The residual teeth of the mandible showed the following findings: tooth 48 was impacted and displaced, tooth 45 showed mobility grade 3 and was periodontally insufficient. The anterior residual teeth 33–43 presented with increased probing depths on the canine teeth and increased mobility (grade 2).

The treatment strategy for the maxilla included as a first step a conservative periodontal therapy of the anterior residual teeth for strategic preservation and fixation of the existing prosthesis until implant insertion.

Afterwards, the residual teeth were removed and a bilateral sinus floor augmentation was performed in a two-stage procedure. Following a 3-D planning, eight endosseous implants were inserted with the CAMLOG® Guide System in a flapless procedure, and the prosthetic restoration was realized using a telescopic bridge. In the mandible, tooth 45 was removed while the other teeth were treated with conservative periodontal therapy. The mandibular posterior teeth were replaced and realigned. Teeth 43–44 received veneering of the removable denture.

Conclusions

The original goal of the prosthetic reconstruction was a fixed bridge restoration. Due to the hygienic and functional training phase with the long-term temporary appliance, the patient decided for a removable bridge.

The accuracy and simplicity with which the implants can be inserted in prosthetically correct or anatomically difficult situations is increased significantly by virtual 3-D implant planning in the cone-beam CT or CT in combination with the guided implant bed preparation and implant insertion. Implant therapy is thus facilitated.

The drilling sequence in the CAMLOG® Guide System is different from other systems. While in a conventional drilling sequence the pilot drill is advanced to the final implant length, the drilling sequence guided by the CAMLOG Guide first starts with the shorter pilot drill (length 6 mm). So that all drills are guided by the sleeve geometry from the start, the drilling sequence I performed in succession from the 9 mm drill to the 11 mm drill and finally...
Sinus floor augmentation
Fig. 3. The facial maxillary sinus wall is moved inwards and becomes the neurocranial floor of the maxillary sinus. On the left side, a vertical bone septum (visible on Fig. 1) requires two separate lateral approaches.

Insertion of interim implants
The planned minimally invasive flapless procedure for implant insertion requires a unique fixation for the preparation of radiological materials. The fixation is facilitated by temporary implants in a suitable position.

In order to ensure accurate transferability, the fixation must be performed under radiological control in the identical position as the one of the implantation.

Fig. 4. Filling of the right sinus cavity with blood and xenogenic bone substitute material. Coverage of the lateral window with a resorbable collagen membrane to avoid displacement of the bone substitute material.

Fig. 5. Postoperative panoramic radiograph shows filling of both maxillary sinus cavities.

Fig. 6. Panoramic radiograph with scan prosthesis for determining the fixation positions using the four interim implants.

Implant placement
Fig. 7. Two-part temporary implants fitted with ball abutments in positions 11 and 21. Posterior anchorages in positions 15 and 25.

Fig. 8. The system-specific matrices are placed and secured in the scan template with plastic.

Fig. 9. Fixed ball abutment matrices in scan template. The DVT image is taken immediately with the radiology template mounted.

to the 13 mm drill (maximum implant length). The CAMLOG Guide offers a sleeve system. As opposed to multi-sleeve systems, a single sleeve inserted into the surgical template is adequate for guidance during all drilling sequences and implantation procedures. The implants can be inserted through the sleeves._

References

**Cone-beam diagnostics**

The scan template is fabricated based on prosthetic requirements (functional, esthetic). A bone-anchored and prosthetic-oriented scan can be taken under radiological control due to the unique fixation of the scan template using the interim implants. The thickness of the mucous membrane can be measured by fitting the radio-opaque tooth on the plaster surface. The distance from holding sleeve to bone surface must not exceed 3.5 mm.

**Fig. 10.** Transversal view at region 26. The central axial borehole is clearly visible. Good ossification in the sinus.

**Fig. 11.** All views at implant region 27. From left to right: Lateral view with projection of the temporary implant in region 25, transversal view, panoramic anatomic view, occlusal view.

**Fig. 12.** Transversal view at 24.

**Fig. 13.** Transversal view at 23.

**Fig. 14.** Transversal view at 17.

**Fig. 15.** All views at implant region 16. From left to right: Lateral view with projection of the temporary implant in region 15, transversal view, panoramic anatomic view, occlusal view.

**Fig. 16.** Transversal view at 14.

**Fig. 17.** Transversal view at 13.

**Fig. 18.** Transversal view at 12.
CAMLOG Guide Surgery

Fig. 19. Surgical template with ball retention elements at positions 21, 15, 25 for stable positioning of the template during drilling procedures. Before placement, careful cleaning and disinfection (please see previous page for image).

Fig. 20. Ball retentions on temporary implants for stabilization of the temporary prosthesis, fixation of the scan template during cone-beam scan and positioning of the surgical template during the drill procedure.

Fig. 21. The gingival punch is guided through the sleeves onto the mucous membrane. The punch has no depth stop.

Fig. 22. A scalpel is used to cut out and remove the punched gingival islands after removing the template.

Fig. 23. Resected implant locations 26 and 27.

Fig. 24. The template is mounted again. Start of the Camlog Guide drilling sequence with pilot drill followed by drills of the appropriate lengths depending on the implant length (region 23).

Fig. 25. Guided insertion through the sleeves utilising special Camlog Guide inserting tool.

Fig. 26. The sleeve dimension allows bone condensing and bone spreading procedures through the sleeve (here, osteotome for vertical bone condensation).

Fig. 27. Implants in first quadrant in situ. Depth stops on the surface of the sleeves.

Fig. 28. Postoperative panoramic radiograph.
Fig. 29. Healing after one week postoperatively. The patient had neither complaints nor postoperative swelling (please see previous page for image).

Preparation for provisional

Fig. 30. The surgical template is set back on its fabrication model. The analog plaster reamers are used to create the cavity for the lab analog through the sleeve.

Fig. 31. Implant positions on the plaster cast.

Fig. 32. Mounted lab analogs together with the inserting posts are secured to the sleeves with wax. The lab analogs are fixed into in the plaster cast.

Fig. 33. Cast with lab analogs in place. The transfer of the analog into the correct position through the sleeve of the surgical stent.

Fig. 34. A 0.5 mm thick thermoformed splint is drawn over the abutments. The thermoformed copings perform the space-making task for passivation when cementing the interim restoration.

Fig. 35. Long-term temporary appliance in the articulator.

Fig. 36. PEEK abutments in situ.

Fig. 37. Long-term temporary appliance cemented in situ in terms of early treatment eight weeks postoperatively.
cone beam contact

Claudio Cacaci, DMD, is a specialist in oral surgery and implant dentistry. He studied at the Munich dental school and worked in the department of maxillofacial surgery (Prof. Dr. mult. D. Schlegel) in Munich and in the department of oral surgery and implant dentistry (Prof. Dr. G.H. Nentwig).

In 1997, he founded a private dental clinic with Dr. Jan Hajtö in Munich. In 1998, Cacaci established the Private Training Center for Implant Dentistry (F.I.O.I.) in Munich. He is the founder of the Munich Study Group for Implant Dentistry and a member of various national and international study groups and dental associations.


Since 2009, he has worked in a group practice for implantology and periodontology in Munich, together with Dr. Peter Randelzhofer.

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_case study_ removable bridge

CAD/CAM was used to fabricate the bridge framework out of a fiber composite (KaVo C-Temp) and veneered with an acrylic material. For passivation of the design, proven electroplating was used. Custom CAD/CAM-fabricated zirconia abutments were selected.

Fig. 38 Impression with closed impression posts.

Fig. 39 CAD/CAM-fabricated zirconia abutments bonded to CAMLOG Esthomic inset abutments.

Fig. 40 CAD/CAM fabricated zirconia abutments after one year.

Fig. 41 Veneering work.

Fig. 42 Occlusal view before treatment.

Fig. 43 Radiological situation before treatment.

Fig. 44 Occlusal view two years after final prosthetic restoration.

Fig. 45 Radiological situation two years after loading.
**Table I: Implants used**

Implants used are noted in the table. There were no implants used for teeth #41–48 and #31–38.

Implant type as noted in the table include,

ROOT LINE (RL)/SCREW-LINE (SL) Implant Surface:
Promote® (P)/Promote® Plus (PP)

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