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FULL ARCH RECONSTRUCTION OF THE EDENTULOUS MAXILLA

WITH THE CAMLOG® GUIDE SYSTEM

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Dr Claudio Cacaci is a specialist in Oral Surgery and Implant Dentistry. He studied at the Dental School in Munich and worked in the Department of Maxillo-Facial Surgery (Prof Dr mult. D. Schlegel) in Munich and in the Department of Oral Surgery & Implant Dentistry (Prof Dr G.H. Nentwig). In 1997, he founded a private dental clinic with Dr. Jan Hajtó in Munich. 1998 he 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. Dr. Cacaci is author of the book "Checklist – Implantology" (German, Thieme) and contributing author of the book "Manual of Oral Implantology" (Italy, Edizioni Italia Press). Since 2009, he has worked in the Group Practice for Implantology and Periodontology in Munich, Germany, together with Dr Peter Randelzhofer.

IMPLANTS USED

Tooth	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Implant type		SL	SL			SL	SL				SL	SL		SL	SL	
Implant length		13.0	13.0			13.0	13.0				13.0	13.0		13.0	13.0	
Implant Ø		4.3	4.3			3.8	3.8				3.8	3.8		4.3	4.3	
Implant surface		P	P			P	P				P	P		P	P	

Tooth	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Implant type																
Implant length																
Implant Ø																
Implant surface																

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

PROSTHETICS

- [x] standard
- [ ] platform switching
- [x] removable
- [ ] fixed
- [ ] crown
- [x] bridge
- [ ] cement-retained
- [ ] screw-retained
- [ ] partially edentulous
- [x] fully edentulous
- [ ] other

- [ ] Universal abutment
- [x] Esthomic® abutment
- [ ] Telescope abutment
- [ ] Gold-plastic abutment
- [ ] Ceramic abutment
- [x] Custom zirconia inset abutment
- [x] PEEK abutment
- [ ] Logfit® abutment
- [ ] Locator® abutment
- [ ] Ball abutment
- [ ] Bar abutment
- [ ] Vario SR abutment
- [ ] other

INFORMATION 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 12, 11, 21, 22), the prosthesis could no longer be supported. After loosing 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 43–33 received reveneering of the removable denture.

Initial presentation

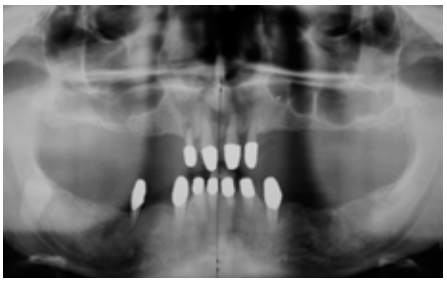

Fig. 1: Panoramic radiograph. The maxillary posterior regions on both sides show significantly reduced vertical bone height (residual height less than 2 mm).

Fig. 2: Clinical situation with removable telescopic prosthesis inserted.

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.

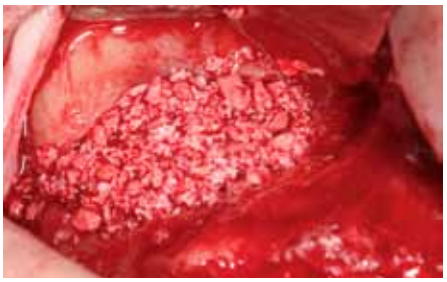

Fig. 4: Filling of the right sinus cavity with blood and xenogenic bone substitute material. Coverage of the lateral window with a resorbable collagen membrane to avoid displacement of the bone substitute material.

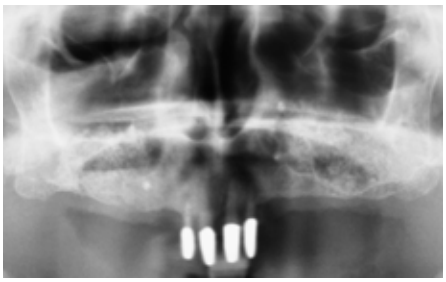

Fig. 5: Postoperative panoramic radiograph shows filling of both maxillary sinus cavities.

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.

Implant placement

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

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.

Cone beam diagnostics

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

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.

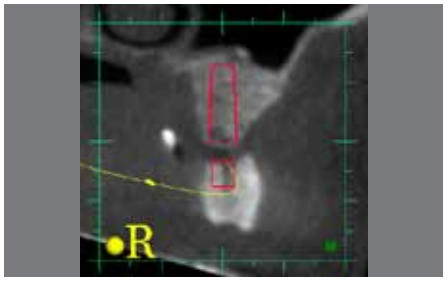

Fig. 10: Transversal view at region 26. The central axial borehole is clearly visible. Good ossification in the sinus.

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.

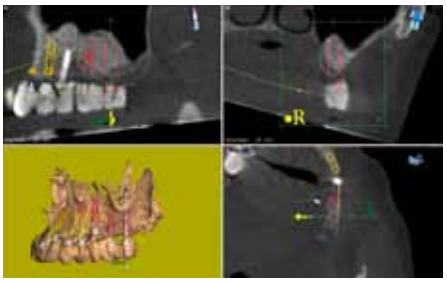

Fig. 11: All views at implant region 27. From left to right: Lateral view with projection of the temporary implant in region 25, transversal view, panoramic anatomic view, occlusal view.

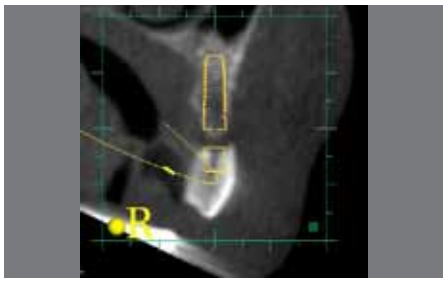

Fig. 12: Transversal view at 24.

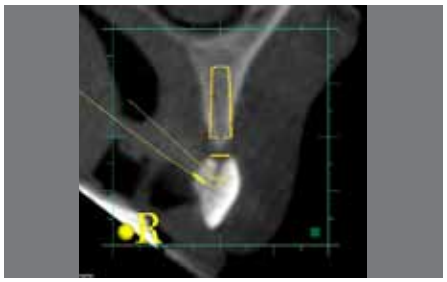

Fig. 13: Transversal view at 23.

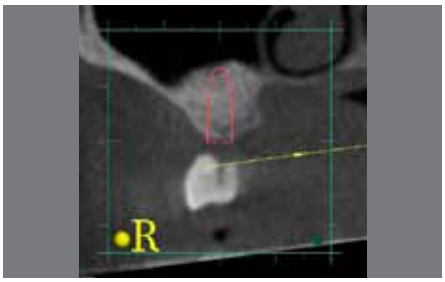

Fig. 14: Transversal view at 17.

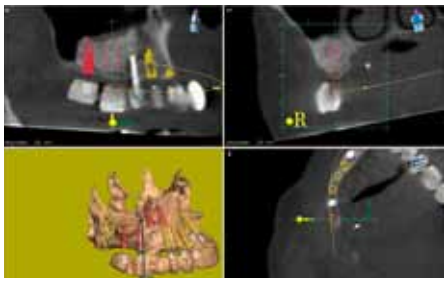

Fig.15: All views at implant region 16. From left to right: Lateral view with projection of the temporary implant in region 15, transversal view, panoramic anatomic view, occlusal view.

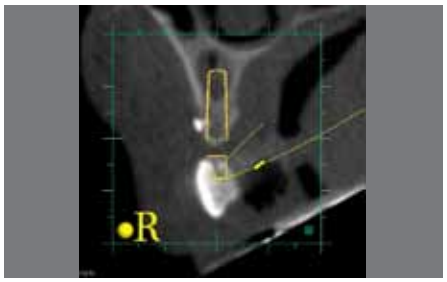

Fig. 16: Transversal view at 14.

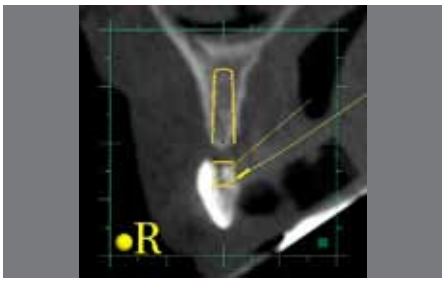

Fig. 17: Transversal view at 13.

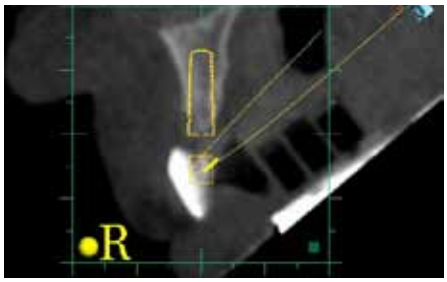

Fig. 18: Transversal view at 12.

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.

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.

Preparation for provisional

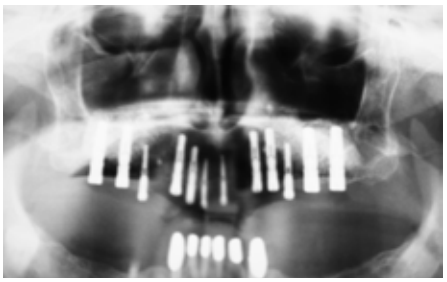

Fig. 28: Postoperative panoramic radiograph.

Fig. 29: Healing after one week postoperatively. The patient had neither complaints nor postoperative swelling.

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**.

Final prosthetic

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. 37: Long-term temporary appliance cemented **in situ** in terms of early treatment eight weeks postoperatively.

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 in function.

Fig. 41: Veneering work.

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 three-dimensional 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 is performed in succession from the 9 mm drill to the 11 mm drill and finally 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.

Initial situation

Fig. 42: Occlusal view before treatment.

Fig. 43: Radiological situation before treatment.

Final restoration

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

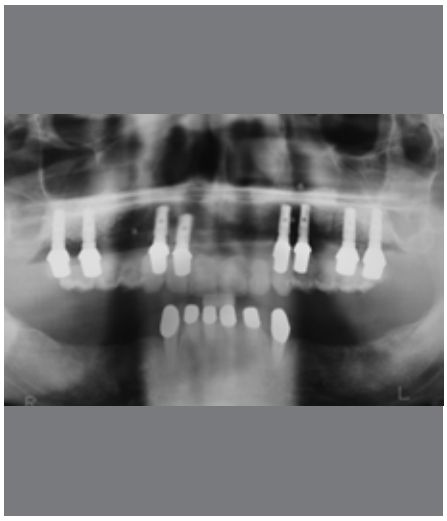

Fig. 44: Radiological situation two years after loading.

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The case was first published in: Mairoana C., Beretta M. Manual of Oral Implantology. Italia Press 2010. (Reprinted with kind permission of the publisher).

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