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IMMEDIATE IMPLANTATION AND FULL-CERAMIC RESTORATION IN THE MAXILLARY ANTERIOR REGION

AN INDIVIDUAL AND INTERDISCIPLINARY TREATMENT CONCEPT

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Dr Arndt Happe after two years as a training assistant in the private dental clinic Schellenstein in Olsberg/Germany under Prof F. Khoury, he established his own practice in Münster/Germany, in 1999. Dr Happe completed his studies as a recognized specialist in oral surgery, in 2000, he focused on implant dentistry and in 2004, he successfully completed the Curriculum Periodontology of the APW. In cooperation with the APW, he is a lecturer in the Master's course on periodontology since 2007 at the Steinbeis University in Berlin, and since 2009, also at the International University of Dresden. Arndt Happe is a speaker in the Curriculum Implant Dentistry of the dental associations Lower Saxony, Westfalia-Lippe and for the BDIZ and in the Master Study Program Periodontology and Implant Therapy of the DGP as well as the Continuum of the DGI. He is a member of the European Academy for Esthetic Dentistry and on the editorial board of the Deutsche Zahnärztliche Zeitschrift DZZ (German Dental Journal). Dr Happe focuses on: anterior tooth esthetics and full-ceramic restorations, esthetics in implant dentistry, augmentation surgery, piezosurgery, soft-tissue management, microsurgery.

DT Andreas Nolte completed his training as a dental technician in 1989 in the dental laboratory of Werner Raum in Lübbecke/Germany. He gained experience in several laboratories, including the practice of Savenije and Partners from 1993 for eight years. Afterwards, A. Nolte worked as a freelance dental technician at home and abroad until he went independent in 2002 and established his own laboratory and training center "Enamelum et Dentinum" in Münster, in 2004. Since 2000, he has been a national and international speaker and trainer and is active in development work. Andreas Nolte is the author of numerous specialist articles in various trade journals, for example, *teamwork* and *dental dialogue.*

IMPLANTS USED

Tooth	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Impl. type							SL									
Impl. length							13									
Impl. Ø							3,8									
Impl. surface							PP									

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

PROSTHETICS

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

- [ ] Universal abutment
- [x] Esthomic® abutment
- [ ] Telescope abutment
- [ ] Gold-plastic abutment
- [ ] Ceramic abutment
- [ ] CAD/CAM abutment on titanium base
- [ ] Temporary abutment
- [ ] Logfit® abutment
- [ ] Locator® abutment
- [ ] Bar abutment
- [ ] Ball abutment
- [ ] Vario SR abutment
- [ ] other

INFORMATION ON PATIENT AND TREATMENT

A young female patient with full-ceramic crowns on teeth 12 to 22 wishes for new restorations. These restorations are to look bright and natural. The medical history is inconspicuous, the gingival type is classified as "thin". Tooth 11, with root treatment, cannot be saved and needs to be replaced with an implant. To obtain the most realistic picture possible of the initial situation, the dental technician photographs the patient in his laboratory. Using this photo and the initial models, he defines the shape and color of the planned restorations and carefully analyzes their positions in the arch for the temporary restoration. On the basis of the data obtained, a temporary bridge is fabricated from teeth 12 to 21 for the day of extraction of tooth 11.

A large part of treatment and the technical work steps were performed analog. The impression was also taken using conventional techniques. A specialty here is the use of a two-part hybrid abutment as base for the pressed ceramic veneer. To obtain a biochemically optimal titanium bonding base, a straight CONELOG® Esthomic abutment was customized in place of the alternatively available CAD/CAM component. The secondary zirconium oxide abutment was waxed up, then both components were scanned. This is where the CAD/CAM process came into play with the fine-tuning of the design on the screen and machine-fabrication of the zirconium oxide secondary abutment. Despite using a titanium primary abutment, the dental technician achieved a natural light effect by the consequent use of fluorescing materials.

Initial situation

Fig. 1: The female patient wants a new restoration with bright, natural-looking crowns in the regions 12 to 22.

Fig. 2: Tooth 11 is not worth saving and to be replaced with an implant.

Fig. 3: Self-made photos and the situation models are evaluated for esthetic analysis, and all details diligently recorded on an appropriate form.

Immediate implantation

Fig. 4: After removing the temporary crowns on 12 and 21, the supra-alveolar periodontal attachment of tooth 11 is severed with a periotome.

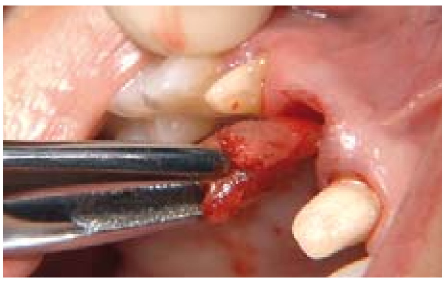

Fig. 5: The root is extracted following atraumatic removal of the crown. The buccal bone lamella connected to the root surface was lost during the process.

Fig. 6: The palatal margin of the alveole is marked with the pilot drill through a deep-drawn template prepared in the laboratory.

Despite a lack of bone wall, an immediate implantation as planned is to be performed. With the aid of the deep-drawn template prepared in the laboratory, the positions are marked prior to preparing the implant bed. After preparing the implant bed without a template, the CONELOG® implants Ø 3.8 mm/13 mm are inserted.

A connective tissue graft is harvested from the palate and inserted using the tunnel technique to improve soft-tissue conditions.

Fig. 7: When inserting the implant (CONELOG®), the surgeon orients himself along the palatal bone wall.

Fig. 8: The implant is palatally displaced in the correct position, the buccal bone lamella no longer exists.

Fig. 9: The position of the implant in the dental arch can be checked with the aid of the template.

Fig. 10: A retromolar bone cylinder is harvested with a trephine drill to obtain autologous bone for augmentation of the buccal lamella.

Fig. 11: The space between implant and buccal soft tissue is filled with a mixture of autologous bone and bovine bone replacement material.

Temporary restoration

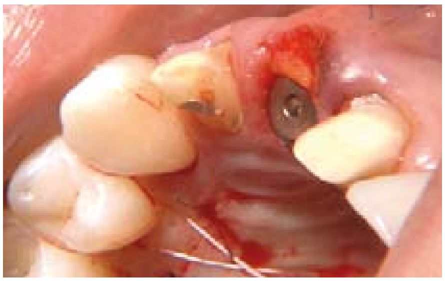

Fig. 12: To obtain optimal buccal contours, a palatally harvested connective tissue graft is drawn under the soft tissue and sutured.

Fig. 13: The temporary bridge is cemented with the healing cap without contact to the pontic.

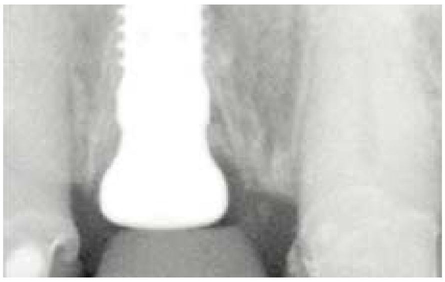

Fig. 14: The subcrestal bone position and good cervical join of the temporary bridge are shown on the postoperative X-ray.

Fig. 15: Good healing and successful integration of the connective tissue graft are evident one week after immediate implantation. The white-yellow deposits consist of fibrin.

Fig. 16: Following a three-month healing time, the implant has been successfully osseointegrated and the soft tissue has stabilized for final impression-taking.

Fig. 17: The periimplant soft tissue is well formed and largely irritation-free under the temporary bridge.

Impression taking

Fig. 18: Good perfusion of the periimplant soft-tissue well can be observed. Buccal tissue thickness exceeds three millimeters.

Fig. 19: Impression-taking of the prepared teeth and the implant.

Fig. 20: Following re-insertion of the temporary bridge, excess soft tissue is revealed in the area of the implant (position 11).

Model preparation and functional wax-up

After a three-month healing period, the periimplant and periodontal tissues are ready for final impression-taking. The healing cap is unscrewed and a CONELOG® Impression post for open trays screwed in. Impression-taking is performed in one step with an open individual tray and a two-phase polyvinyl siloxane (A-silicone).

Fig. 21: Individual stumps made of super-hard plaster with grooves to protect against rotation are fixed in the impression with instant adhesive.

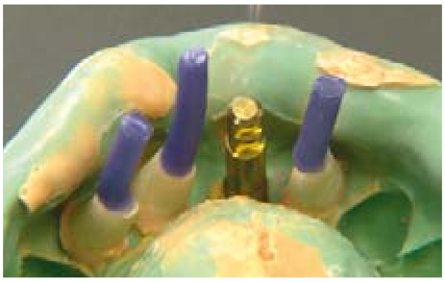

Fig. 22: Preparation of the master model. The wax pins serve as access to the stumps on the master model.

Fig. 23: The precise periodontal and periimplant soft-tissue situation is represented on the master model.

Fig. 24: The marginal border of the planned implant crown is transferred to the plaster surface.

Fig. 25: The periimplant emergence profile was expanded and the papillae sharpened to provide a harmonious gingival profile.

Fabrication of primary and secondary abutments

Fig. 26: Optimal hold of the wax-up during try-in through filled implant interface.

Fig. 27: Overview of abutment options: (from left): CONELOG® Esthomic abutment (gingival height 1.5–2.5 mm) prior to and after customizing, CONELOG® Titanium base CAD/CAM.

Fig. 28: The Esthomic abutment, extended with a bonding aid, shows the palatal positioning of the access channel.

Fig. 29: Customizing the primary abutment ensures sufficient coating strength of the zirconium oxide abutment.

In this case, the CONELOG® Titanium bases CAD/CAM are too low due to the apical position of the implant shoulder. Therefore, the dental technician decides on a considerably longer, straight CONELOG® Esthomic abutment, which is customized for use as a titanium bonding base. Subsequent bonding of the primary and secondary abutments results in a hybrid abutment with full anatomical contours.

Fig. 30: The titanium base and the completed model of the secondary abutment are scanned in the laboratory. Buccal space is left for the planned pressed ceramic veneer.

Fabrication of veneer and final crown

Fig. 31: The sintered abutment left (without) and right with fluorescent solution treatment.

Fig. 32: Firing of a highly fluorescent, etchable zirconium oxide veneer ceramic. The shape of the abutment is optimized prior to modeling the press cap.

Fig. 33: The layer thicknesses for veneering the pressed ceramic caps are checked with the aid of the vestibular, twice-divided silicone index.

Fig. 34: Modeling of the mamelon for the implant-supported veneer from a palatal view.

Fig. 35: After glaze firing and polishing, the natural anatomy and surface characteristics of the restoration are checked.

Fig. 36: Esthetic try-in: the patient and her dental technician, Andreas Nolte, appreciating the highly successful outcome and nearly completed treatment.

Insertion

Fig. 37: The pressed ceramic veneer is mounted on the previously bonded hybrid abutment by bonding with dual-curing composite.

Fig. 38: The transitions between the abutment and the veneer are smoothed and polished to a high gloss with a brush and polishing paste.

Fig. 39: The implant restoration is screw-retained. For biomechanical reasons, the screw access channel is placed in the zirconium oxide section.

Fig. 40: The palatally inserted crowns and the sealed screw access channel of the implant crown.

Fig. 41: The X-ray check-up confirms successful osseointegration and the natural emergence profile of the implant-supported restoration.

Fig. 42: The crowns on teeth 12, 21 and 22 and the implant restoration on 11 fit harmoniously to the dental arch and the remaining teeth.

Fig. 43: The close-up shows the healthy periimplant soft tissue and the natural surface of the restorations.

Fig. 44: The side profile also shows the natural contours of the restoration and the successful interplay between red and white.

Fig. 45: The patient's relaxed smile confirms that the effort and attention to detail have been appreciated.

CONCLUSIONS

The example demonstrates the successful immediate implantation in the anterior maxilla on a female patient with thin biotype and high smile line. In addition, the buccal bone lamella was missing so that bone and soft tissue had to be augmented as part of immediate implantation – without preparing a flap. This demanding task can only succeed when the surgeon, and, if applicable, the prosthodontist and the dental technician, work together as an optimal team and use suitable methods and materials. In the presented case, surgery and prosthetics were performed by the same dentist who has been working together intensively for many years with the dental technician in the same location. At the beginning of the treatment, the patient presented in the laboratory for an esthetic analysis to give the dental technician a detailed picture.

In order to obtain an adequate tissue volume in the implantation area, the surgeon employed proven bone and soft-tissue surgical procedures. These included using a bone mixture for augmentation and a tunnel technique for thickening the buccal soft tissue. The literature shows that stable tissue volume and a constant marginal soft-tissue border can be achieved in this way even in case of an impaired implantation site with missing bone lamella. This procedure is not (yet) recommended in the current consensus statements by the professional associations due to difficult predictability of individual results.

As all components of the implant-supported restoration were bonded in the laboratory, the dentist was able to screw them in place together as a single piece and in a single session. This meant fewer treatment sessions for the patient, who did not have to return to the practice after impression-taking until final insertion. The esthetic try-in before final bonding of the individual parts was performed in the laboratory. The described procedure is only possible in close cooperation and with full confidence between the team partners.

Initial situation

Fig. 46: Initial situation with tooth 11 (not worth preserving).

Final restoration

Fig. 47: X-ray of final restoration shows successful osseointegration.

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